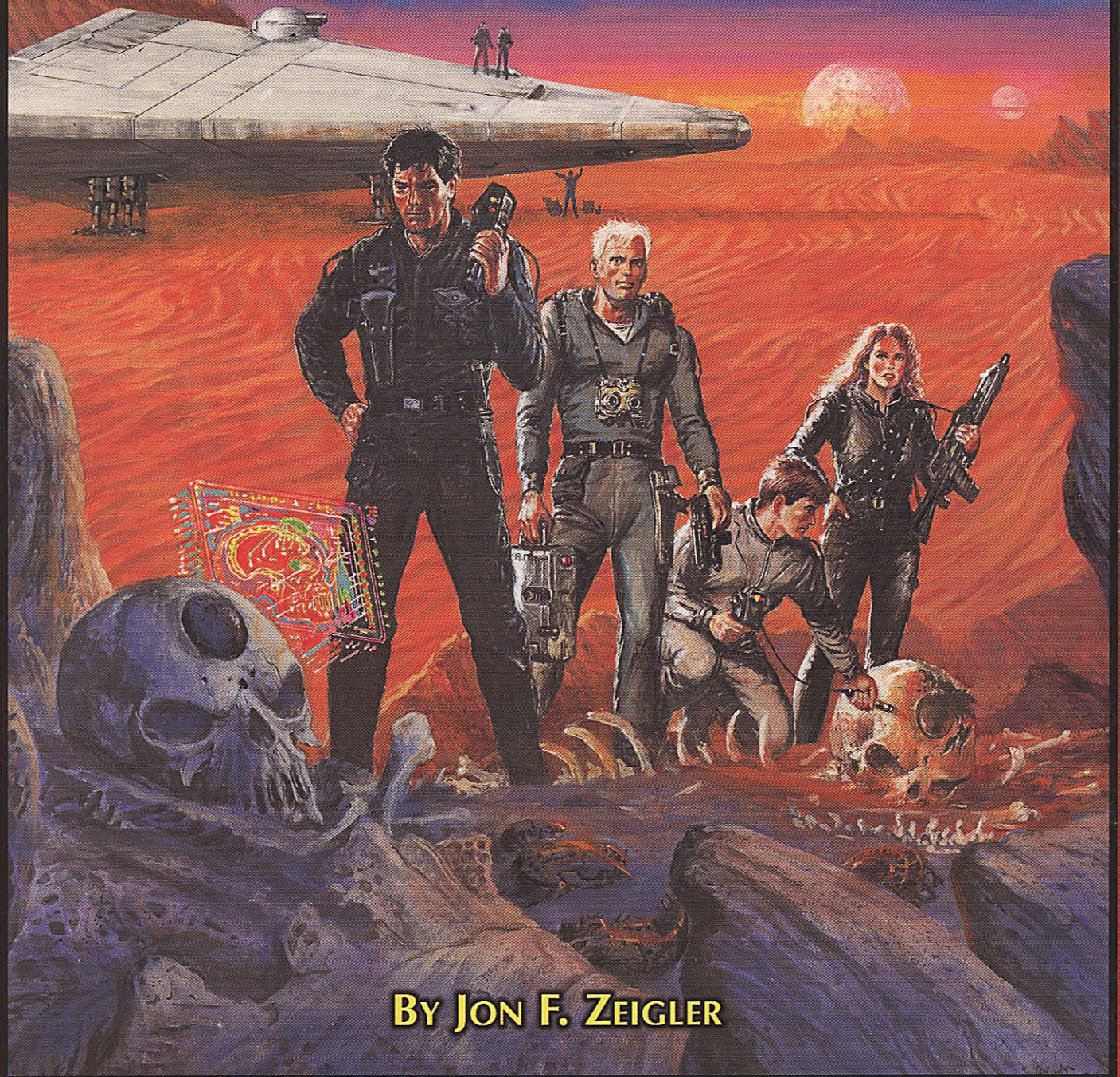


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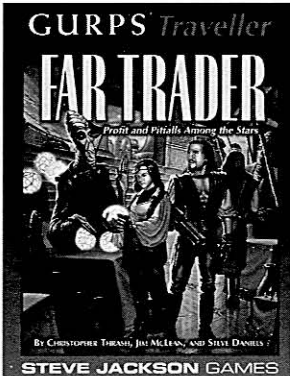
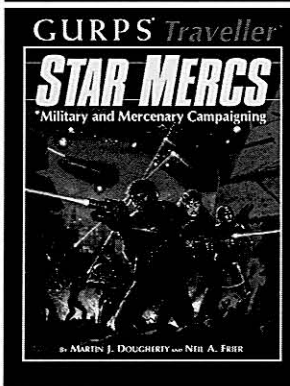
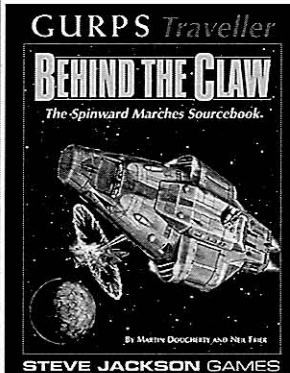
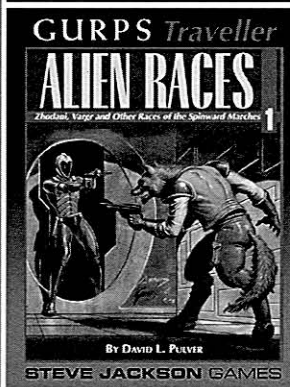


BY JON F. ZEIGLER

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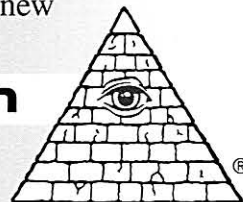
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FIRST IN

Exploration and Contact Among the Stars

By JON F. ZEIGLER

*Based on the award-winning Traveller
science fiction universe by MARC MILLER*

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*Illustrated by JESSE DEGRAFF, GLENN GRANT,
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*Author's Dedication:
To Poul Anderson, with profound thanks.*



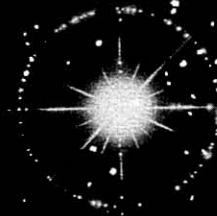
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ISBN 1-55634-368-X

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STEVE JACKSON GAMES

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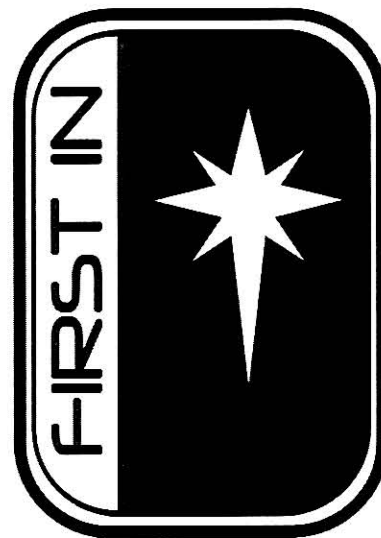
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About GURPS

Steve Jackson Games is committed to full support of the **GURPS** system. Our address is SJ Games, Box 18957, Austin, TX 78760. Please include a self-addressed, stamped envelope (SASE) any time you write us! Resources now available include:

Pyramid (www.sjgames.com/pyramid). Our online magazine includes new rules and articles for **GURPS**. It also covers all the hobby's top games – **AD&D**, **Traveller**, **World of Darkness**, **Call of Cthulhu**, **Shadowrun** and many more – and other SJ Games releases like **In Nomine**, **INWO**, **Car Wars**, **Toon**, **Ogre Miniatures** and more. And Pyramid subscribers also have access to playtest files online, to see (and comment on) new books before they're released.

New supplements and adventures. **GURPS** continues to grow, and we'll be happy to let you know what's new. A current catalog is available for an SASE. Or check out our Web site (below).

Errata. Everyone makes mistakes, including us – but we do our best to fix our errors. Up-to-date errata sheets for all **GURPS** releases, including this book, are always available from SJ Games; be sure to include an SASE with your request. Or download them from the Web – see below.

Q&A. We do our best to answer any game question accompanied by an SASE.

Gamer input. We value your comments. We will consider them, not only for new products, but also when we update this book on later printings!

Internet. Visit us on the World Wide Web at www.sjgames.com for an online catalog, errata and updates, and hundreds of pages of information. The home page for **GURPS Traveller** is located at www.sjgames.com/gurps/traveller. We also have conferences on Compuserve and America Online. **GURPS** has its own Usenet group, too: rec.games.frp.gurps.

Much of the online discussion of **GURPS** happens on GURPSnet. To join, send mail to majordomo@io.com with "subscribe GURPSnet-L" in the body, or point your World Wide Web browser to: www.io.com/GURPSnet/www.

Page References

See **GURPS Compendium I**, p. 181, for a full list of abbreviations for **GURPS** titles. Any page reference that begins with a B refers to **GURPS Basic Set, Third Edition Revised**; e.g., p. B144 refers to page 144 of **Basic Set**. CI refers to **Compendium I**, CII to **Compendium II**, GT to **GURPS Traveller**, S to **Space, Second Edition**, UT to **Ultra-Tech, Second Edition Revised**, UTT to **Ultra-Tech 2**, and VE to **Vehicles, Second Edition**.

Introduction

In 1983, the *Scouts* book was published for *Classic Traveller*. The effect on the game was immediate. Until then, the game had seemed to be about traveling through space, meeting exotic people, and shooting them. Now there was a taste of exploring a new frontier, meeting exotic people, and possibly finding common ground with them. *Traveller* had tapped into the "sense of wonder" that underlies all the best science fiction. And there was a dose of scientific realism to give that sense of wonder solid ground to stand on.

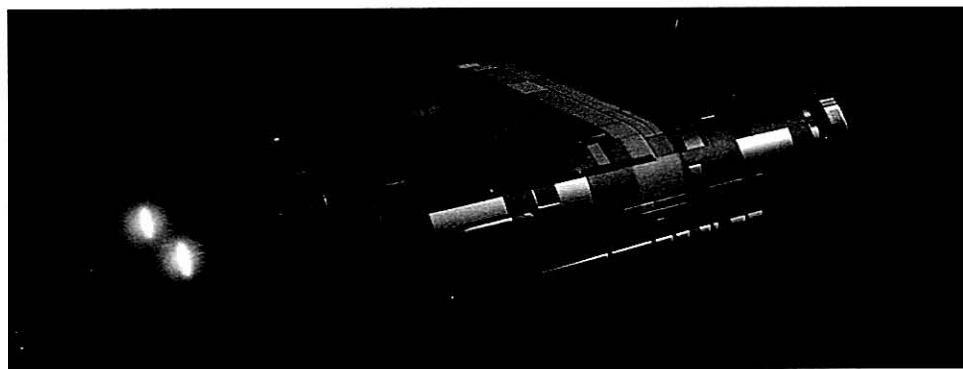
Over the years, that little black book with the yellow stripe has held up surprisingly well. This volume can't claim to do more than add onto it and clean up a few dusty corners. I hope you can use it to bring rich detail to your favorite *Traveller* universe, or build a fresh world of your own.

ABOUT THE AUTHOR

Jon F. Zeigler has been a science fiction fan since the cradle (literally). He became interested in world-building at the age of 10, and later latched onto *Classic Traveller* primarily for its simple but elegant world-design rules. In 1988 he discovered **GURPS** and hasn't looked back since, although he's thoroughly pleased to be able to combine his favorite game system with one of his favorite SF universes. He and his wife and son live in Maryland, where he works for the federal government as a mathematician. In his spare time he reads history and the occasional science fiction or fantasy novel. He is the author of **GURPS Greece** and has also done freelance work for FASA's *Shadowrun* and *Earthdawn* product lines.

ABOUT THE LINE EDITOR

Loren Wiseman was one of the founding partners of GDW, Inc., original publisher of *Traveller*, and spent over 20 years there as a game designer, developer, typesetter and editor. After GDW closed, Loren freelanced for a time, and then came to SJ Games, where he is the *Traveller* line editor and expert-in-residence.



THE TRAVELLER NEWS SERVICE

For many years a feature of the *Journal of the Travellers' Aid Society*, *TNS* chronicled the ongoing life and times of the Imperium. Loren Wiseman is once again writing *TNS* as the alternate history of the Third Imperium develops. It is updated regularly; read it online at www.sjgames.com/gurps/traveller/news.html. "Back issues" of *TNS* are also online.

The SJ Games *Traveller* page has links to the *Traveller* Web Ring, and thus links to most of the major *Traveller*-oriented web sites that exist. For information on subscribing to the *Traveller* Mailing List, contact rwm@mpgn.com.

The Scout Service

The Imperial Interstellar Scout Service is equal in stature to the military services. Some (not all of them scouts) would claim that the Service is the most important institution in the Imperium. After all, the Imperium isn't built entirely on a foundation of conquest. There is also patient exploration and comprehension, the stream of communication between eleven thousand worlds. Without the Scout Service, the Imperium could not exist.

For over a thousand years, the IISS has performed with great efficiency and considerable heroism. It has also maintained an *esprit de corps* that is the envy of many a military commander.

STRUCTURE

The IISS has existed since the first days of the Imperium, and has often had to take on new missions. This history has made it a very complex organization, requiring a diverse pool of talent. The major divisions of the Scout Service are the seven Offices. Each of these is further divided into two or more branches, which perform the Service's specific missions.

Overall control of the Service is in the hands of IISS Headquarters, located on Capital. Headquarters is normally concerned with overall policy and procedures, leaving day-to-day control of operations to local commands in each sector and subsector. Most scouts never deal with Headquarters, except as a distant source of general policy.

The seven Offices are divided into two broad groups. The first is composed of the Administration, Operations, Technical Services, and Detached Duty Offices. The task of these Offices is to direct and support the Service. The second division is composed of the Exploration, Survey, and Communications Offices. These Offices actually carry out the missions of the Service. Since the seven Offices are officially the highest-level divisions of the IISS, these two groups have no official name. However, most scouts know them as the Bureaucracy and the Field.

The Bureaucracy is a typical cluster of Imperial agencies, governed by regulation and policy directive. Most of its members work at the thousands of scout bases throughout the Imperium. They plan projects, keep records, collate data, deal with budgets and procurement, and maintain the facilities and ships owned by the Service. Their culture is typical for a bureaucracy, valuing conformity and loyalty above all. The usual reward for success is advancement up the ranks of the hierarchy.

The Field is very different, and may be unique among Imperial institutions. Members of the Field often work far away from any scout base, aboard small ships or as part of distant expeditions. Under those conditions, they must be independent and flexible in order to succeed. Members of the Field carry no rank. They work alone, or in small teams which are created for specific missions. They operate tiny ships in deep space, carry vital messages, make maps, explore new worlds.

Inspirational Reading

The *GURPS Basic Set*, *GURPS Compendium I*, and *GURPS Traveller* are required for any *GURPS Traveller* campaign. *GURPS Ultra-Tech I*, *GURPS Ultra-Tech II*, and *GURPS Vehicles* may be useful for their coverage of high-technology vehicles and equipment. For Scout campaigns, we also recommend *GURPS Space*, which includes a simple world-building system underpinning the more complete rules in this book.

Much great science fiction has been written around the theme of exploring new worlds. We strongly recommend the works of Poul Anderson, especially his "Polesotechnic League" and "Terran Empire" stories (many of which are out of print, but can be found in used bookstores). Aside from being rousing adventure stories, these series include a great deal of superb world-building. There's a reason why this book was dedicated to him . . . go, read, and see for yourself.

Possibly the best construction of strange alien cultures (and strange human ones) is found in the work of C. J. Cherryh. We particularly recommend her "Alliance/Union" series, including the "Faded Sun," "Chanur," and "Foreigner" spin-offs.

Continued on next page . . .



Inspirational Reading

[Continued]

Meanwhile, here are a few other fictional sources that you may find useful. This list should only be considered as a starting point. In particular, unlisted works by the same authors may be worth pursuing.

A Million Open Doors and *Earth Made of Glass* by John Barnes.

Startide Rising by David Brin. Also look for *Brightness Reef* and its sequels.

Mission of Gravity and *Star Light* by Hal Clement.

Citizen of the Galaxy by Robert A. Heinlein.

Destiny's Road by Larry Niven. Also look for the "Known Space" stories, especially the collections *Neutron Star* or *Crashlander*, as well as the novel *Ringworld* and its sequels.

The Mote in God's Eye and *The Gripping Hand* by Larry Niven and Jerry Pournelle. (*The Gripping Hand* was published as *The Moat Around Murcheson's Eye* outside the U.S.)

The Legacy of Heorot and *Beowulf's Children* by Larry Niven, Jerry Pournelle and Steven Barnes.

Red Mars and sequels, by Kim Stanley Robinson.

A World of Difference by Harry Turtledove.

Their culture values initiative and expertise. Field operatives are uninterested in rank, but will work hard to earn the respect of their peers (see sidebar).

Naturally, there is considerable tension between the two. Many an Operations officer has had to decide what to do about a Field operative who succeeded brilliantly in his mission, but did so by breaking half the regulations in the book. Meanwhile, every Field operative resents the paperwork he must file before going out in search of his next exploit.

ADMINISTRATION OFFICE

Administration Office manages the resources of the Scout Service. Although many scouts despise Administration Office as a haven for "bean-counters," it is essential to the Service's activities. It's also surprisingly small relative to the size of the entire Service. The Administration Office uses advanced computer technology to make record-keeping and even some routine policy decisions automatic. This leaves administrative officers free for personal interaction and high-level planning. It also removes any need for platoons of paper-pushers. The Office is divided into the Personnel, Finance, and Procurement branches.

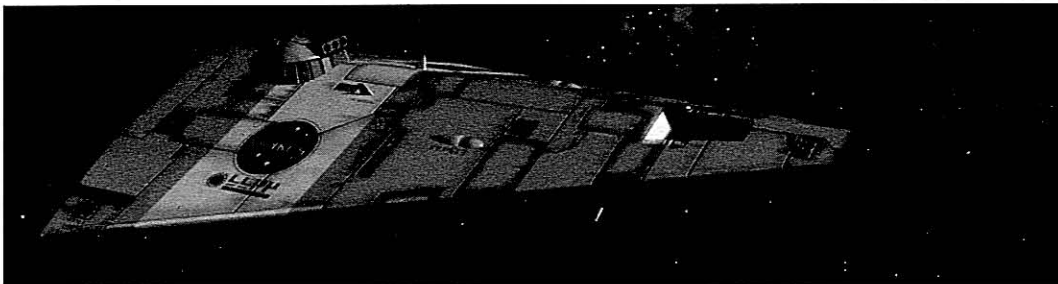
Personnel Branch is responsible for managing the career of every member of the Scout Service. It recruits, hires, and assigns new scouts. It manages the promotion and peer review programs (see sidebar), administers transfers, and processes retirements. It maintains the personnel records of every current and former scout.

Aside from its records-management function, the Personnel Branch has an important unofficial mission. The Service assumes that scouts are more productive when they are happy in their work. So Personnel Branch recruiters make sure that applicants have the right temperament for the Service, as well as the right skills. Once a scout is in the Service, he will find his Personnel officer to

be a useful resource. Personnel may find a mentor for a new recruit, help a scout get necessary training, or find a challenging assignment for a scout who needs a chance to take on greater responsibility. It's this attention to personal detail that gives the IISS a highly motivated workforce, and a surprisingly low turnover rate.

Procurement and Finance Branches are closely related. Procurement is responsible for purchasing materials, equipment, and services to be used by the IISS. It maintains contact with suppliers and sets up contracts with them. Finance, on the other hand, is responsible for the flow of money. It prepares budgets, makes payment for items purchased by Procurement, and also handles the payroll for all scouts, including salaries, bonuses, incentive awards, and pensions.

Procurement and Finance Branches are probably the most traditional (one might say the stuffiest) sections of the Scout Service. Members of these branches are trained purely in administrative skills, and they rarely get caught up in the "mystique" of the Service. As a result, they are the most likely to leave the Service simply to take employment elsewhere. Such experience is highly sought-after by commercial firms, especially those megacorporations which bid on Imperial contracts.



Peer Review

The Field is famous for having no official system of rank. Field scouts work for respect, not for position. This collegial ideal only goes so far, of course — an IISS saying is that "you can't retire on respect." Without ranks, how does the Service assign higher pay to its best Field scouts?

Part of the answer is a set of skill assessments that Field scouts take throughout their careers, administered by Education Branch. Field scouts spend a great deal of effort on passing their exams, since that makes them eligible for higher pay.

Continued on next page...

OPERATIONS OFFICE

Operations Office is the "brain" of the Service. It directs the construction, maintenance, and operation of IISS ships and bases. It also assigns missions and evaluates the results. It is divided into four branches: Maintenance, Security, Base, and Scout Fleet.

Maintenance Branch maintains and repairs all the installations, ships and equipment used by the Service. These services are also available to ex-scouts in possession of surplus IISS starships, at cost. Maintenance crew are trained in technical skills, and have a high reputation for competence and efficiency. Despite inter-service rivalries, even Imperial Navy captains are usually happy to place their smaller ships in the hands of IISS "yard dogs."

Security Branch is charged with internal security and law-enforcement tasks for the Service. Security officers serve as military police on IISS property, and as light marines on board IISS ships. They also have extensive law-enforcement powers among the general public. They may question, detain, or arrest suspects for violations of many Imperial laws. In particular, they hold the primary responsibility for enforcing the interdiction laws with regard to worlds which are under IISS jurisdiction. During such operations, Security officers may demand the cooperation of local authorities as necessary. Security Branch members also sometimes serve as clandestine agents for Intelligence Branch. In this role, they support covert activities, especially when firepower is required.

Security Branch personnel are trained in a wide variety of skills, including combat/weapon skills, tactics, law and police procedure, psychology, and sociology. They are not trained to be aggressive, but they are still highly respected for their integrity and their calculating approach to combat. Security Branch members tend to remain in Security for most of their careers, set aside from the rest of the Service by their special training and responsibilities. A few members are recruited for the Special Security Service, an elite commando detachment whose task is to recover IISS personnel or equipment when they fall under hostile control. "S-3" is not on a par with the Sylean Rangers or Imperial Marines, but within their limited sphere of responsibility they are quite formidable. For more on the Special Security Service, see *Star Mercs*.

Base Branch is responsible for the operation of hundreds of IISS installations throughout the Imperium. This Branch has probably the most pedestrian mission of any part of the Service. Its members are ground crew, stevedores, motor pool drivers, contract technicians, and clerks.

Where possible, the Service tries to recruit most of the staff for each base locally, since it is rarely

Peer Review

[Continued]

The key word is *eligible*. To actually earn a higher pay grade, a scout must demonstrate the ability to work well under real field conditions. These abilities are not measured directly by the Bureaucracy. Instead, each scout is rated by his colleagues in a process of *peer review*.

Each branch of the Service maintains peer-review boards, composed of senior Scouts from that branch. Most experienced Field scouts (with at least twelve years of service) must spend at least part of their time serving on a board. This duty is regarded as necessary but unpleasant, since most Field scouts are uncomfortable "grading" their colleagues. Scouts who appear to enjoy this duty too much are jokingly referred to as "begging for a transfer" to the Bureaucracy.

At the end of each mission, every Field scout writes a personal mission report. As part of this, the scout names the team member (other than himself) who made the greatest contribution to the success of the mission, and adds a short note justifying his choice. These performance codicils are kept strictly confidential.

When a Field scout applies for a higher pay grade, he gathers evidence of his accomplishments and drafts a summary of his work since his last grade increase. His Personnel Officer attaches performance reports from his previous missions. This package of documents is submitted to the closest available peer-review board for the scout's branch of the Service. The board considers many applications at once, recommending that pay raises be granted or denied. Board decisions can be appealed to the seniormost Field scout available, but this rarely happens.

Actual pay raises are awarded by Personnel Branch. The only time a board's recommendations might not be followed is when the payroll budget is too tight. Otherwise the Bureaucracy simply administers the peer-review process and has no say in the results.

The peer-review process is subjective, but it usually works. Field scouts who are known for competence and teamwork are advanced, makeweights aren't. Peer review has the trust and support of most Field scouts.



After-Action Report

"We came in low and slow. The natives certainly weren't going to detect us, since all they had to work with was the Mark I Eyeball. Our target was another story, so we moved at nap-of-earth and kept an eye on our passive countermeasures. Never pays to be too careful.

"It worked. We saw the smuggler's base camp, a couple of pre-fab shelters next to a hacked-out landing strip. Better yet, we saw that intel had been accurate. Their Empress Marava-class was there, probably getting ready to onload gemwood in exchange for rifles and ammunition. IR gave me the locations of a couple of sentries, huddling in their parkas next to a campfire, not terribly alert. I had Corporal Nurashu look for active EM signatures and paint them on our HUDs. The results told me where automatic weapons were probably emplaced. My on-board computer and I ran through a few tactical projections.

"Good enough. They were amateurs. I gave the word.

"Three smart bombs took out their active sensors. I downed Happy and Dopey by the fire with a Vee-Two gas grenade. We reached the ship's hatch, slapped on the breaching charge, and were in. I tripped the riot-act recording then: 'You are under arrest for violations of the Native Cultures Protection Decree of 683. Drop your weapons and comply with the directives of the arresting officers . . . ' You know the one, with all the subsonics to trip the perps' fear-reflexes.

"I think a couple of the crew might have resisted if we'd given them a chance, but it was way too late for that. We were already inside, almost invisible against the bulkheads, and now all they had was the old Mark I. Corporal Ferris laid one out with the butt of his rifle. Another one actually managed to point his snub pistol at Nurashu, but I got it away from him. That was the only serious injury to report – I ended up crushing the bones of his forearm because I didn't have time to be careful.

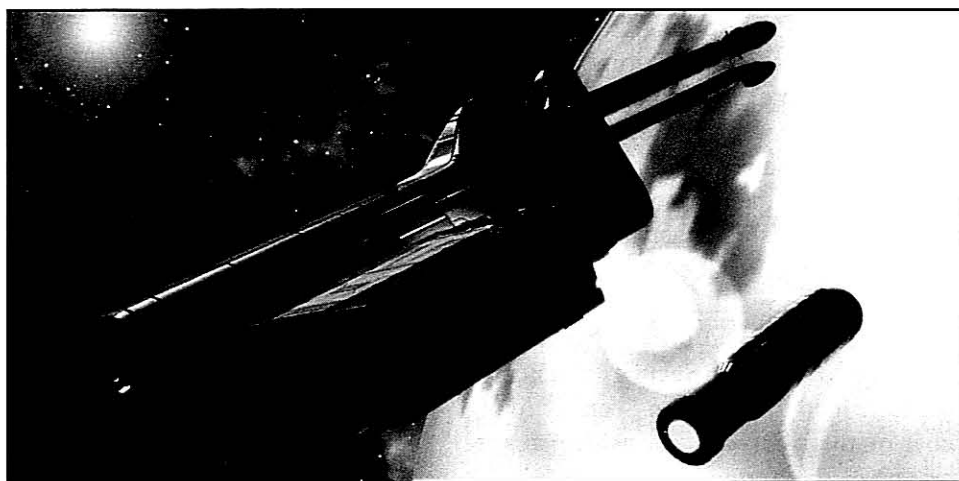
"Lance Iwashika reported the bridge secure and ship's logs undamaged, about ninety seconds after I'd given the attack order. Clean and neat. I wish they all went that smoothly."

*– Sergeant Maryam al-Saddiq,
Special Security Service*

cost-effective to bring such commonplace skills across parsecs. Of course, since scout bases are often placed on backwater worlds, this provides a rare opportunity for local people to enter Imperial service and perhaps get out to the stars. Many Base Branch personnel are young, working to complete their educations and try for assignment to another Office. Others are mature and experienced, unwilling to leave their home worlds but still proud to be in Imperial service.

Scout Fleet consists of all the spaceships used by the Service. The Scout Fleet supports the Field by providing ships and some crew. On paper, the Fleet is organized like a cohesive naval unit, although most of its ships are normally "on loan" to various other Offices.

Scouts permanently assigned to the Fleet have an unusual position. They are technically members of the Bureaucracy, but they spend most of their time working among Field operatives. As such, Scout Fleet personnel are trained to operate in both cultures. This often requires well-developed social skills, along with the ship-handling competence required by the Fleet's main mission.



TECHNICAL SERVICES OFFICE

This Office is responsible for scientific research and technical education within the Service. It is divided into the Education Branch and the Research and Development Branch.

The IISS relies on a workforce which is well-trained in a wide variety of skills. This is such an important feature of scout life that an entire Branch is devoted to the task of training Service members. The *Education Branch* (also called "the School") provides library data to any team or individual scout who needs it.

Education Branch ensures that the library computers of IISS ships and bases are kept current. It also develops sophisticated courses of study for scouts who need new skills, a much more demanding task than the simple provision of information. Finally, it sets standards for technical expertise in the Service. Education Branch often recruits subject-matter experts from other parts of the Service and from outside the Service, training them in educational techniques and putting them to work in course development.

Every scout deals with Education Branch on a continuing basis throughout his career. Even so, members of the Bureaucracy often have a very different experience with Education Branch than do members of the Field. Long-standing tradition leads the School to be very free with course material for Field scouts. Indeed, scouts who are on duty for long periods in deep space are allowed to take courses that have nothing to do with their duties, in the interest of keeping

them occupied and motivated. Meanwhile, members of the Bureaucracy must justify each course they take, showing that they have met a strict schedule of prerequisites and that the new skills are directly relevant to their duties. The possibility of a free education is one of the biggest selling points for Field duty, and also causes some of the tension between Bureaucracy and Field.

Research and Development Branch is responsible for scientific investigation of data acquired during IISS explorations and surveys. It is also responsible for the development of new ships or equipment used by the Service.

"R&D" has a reputation for being on the cutting edge of Imperial science. Many of the Imperium's foremost experts work for the Branch, in fields such as physics, astronomy, planetology, sociology, linguistics, naval architecture, and computer science. Many Field operatives transfer to R&D late in their careers, which may be why R&D has a reputation as the most free-wheeling section of the Bureaucracy.

DETACHED DUTY OFFICE

The Detached Duty Office's main mission is to keep track of all scout personnel on reserve status (see sidebar). It also controls surplus IISS starships, particularly the small survey and courier vessels which are loaned out to reserve scouts. Its major divisions are the Records Branch and the Intelligence Branch.

Records Branch maintains records on all scouts serving on detached duty. These records are used to reactivate scouts in time of war or emergency, or to find ex-scouts who have badly needed skills. Scouts in possession of surplus starships are actively monitored. Others are simply spot-checked on periodic (but rare) occasions, to ensure that they are meeting their obligation to stay in contact. Records Branch personnel are simple bureaucrats, trained primarily in administrative and computer skills.

Intelligence Branch is the Service's covert-operations arm. Its openly acknowledged function is to interview detached-duty scouts, gathering information on events both inside and outside the Imperium. Secretly, it also maintains espionage assets (spies and double agents) in regions where information is most needed. While Naval Intelligence is concerned with the military capability of foreign powers, IISS Intelligence is more concerned with political and economic forecasts. Aside from administrative skills, Intelligence Branch personnel are trained in interview techniques, intelligence analysis and spycraft.

Some of the most interesting (and dangerous) IISS missions involve covert intelligence-gathering. Scouts go undercover, posing as merchants or other legitimate civilian travelers, to gather economic or social intelligence in areas outside the Imperium. Other missions involve stealthy jumps deep into foreign territory, to sit in the outskirts of important star systems and pick up signals intelligence (the *Pytheas*-class exploration cruiser in Chapter 3 is particularly suited for such missions). Scouts from the Exploration Office or Scout Fleet are often involved in such data-gathering missions, under the direction of Intelligence Office.



Scout's Lament

"There were six of us then. We came here to the Last Post to drink to our first assignments, then we went our separate ways. We vowed to stay in touch, and we did, as long as we could.

"Keiran was the first. Got attached to the Duke's squadron during the war, jumping behind the lines to spy out Zho task force movements. Just dropped out of sight, never came back from his last run. I hear his name's on the Hero's Spire on Regina, etched in letters a few microns tall.

"Shana missed the war, but she caught a bullet anyway. She was working as a covert observer on Asgard at the time. There was a peasant revolt, the All-King sent in troops, and Shana didn't make it out in time. She's probably in an anonymous grave somewhere.

"Nobody knows what happened to Julian. Hey, we all know that sometimes a starship goes into jump and never comes back out. You have to figure that every Xboat drops into that black hole eventually, as much time as they spend in jump-space. Julian went with his. Or maybe he misjumped and drifted in deep space somewhere until he suffocated. They only give you a few extra days of life support on those things, after all.

"I liked Hyalearl, even if she was a bit too vain about her Aslan heritage. She was doing a local-ecosystem survey when it happened. There was this ground-cover plant there, giving off fumes that ordinarily don't bother anybody. There was a temperature inversion that day, to concentrate the stuff in the little valley where she was working. By the time she realized what was happening, it was too late. Turns out the toxin affects Aslan a lot worse than humans. Ironical, that she was so proud of the thing that ended up killing her. At least she got a decent funeral with her clan.

"Michiko always planned to put in enough time to earn a detached ship. She had big plans to see the Marches on her own. She almost made it, too. At least until her team found something on a planet I don't have the clearance to know about. She's still alive, last I heard, but she'll never fly her own ship now. It's hard to do that when you're catatonic.

"I'm still here, at least. The things I've seen! Wouldn't trade it for the Iridium Throne. I just wish the others could have been here to share this with me.

"Here's a toast. To absent friends."

— Sergei Ilgud, IISS Administrator, retired

"Most people believe that the Scout service consists only of dangerously anti-social loners and detail-obsessed bean-counters. This is patently not true: we have our fair share of odd-balls, like every other service."

*– Twenty Years in the IISS,
Janos Projaska*

Detached Duty

Most Scouts who leave the Service are considered on "detached duty" (reserve status) until retirement age. They must stand ready to return to active-duty status at any time. Generally, the Service only activates its detached-duty members in time of war or some other emergency. However, individual Scouts may also be called back to active duty when they have expertise that is needed for a specific mission.

A Scout on detached duty must keep the Service informed of his current location and (at least in general terms) his activities, so that he can be quickly found and reactivated if necessary. He is also required to go to an IISS installation from time to time and report on what he has seen while traveling. In return, he is paid for any time on active duty. He may also make limited use of IISS facilities for his own purposes. For example, he can use guest quarters at the local scout base on a space-available basis.

A few reserve scouts are loaned surplus starships, which can be refueled or given routine maintenance (at cost) at IISS bases. Naturally, the requirement to report in is much more stringent for any scout in possession of a surplus ship. In particular, the logbooks of each surplus ship are downloaded every time it stops at an IISS facility for service. These "books" are difficult for even the ship's captain to alter, and include a trace of internal and external sensor readings as well as the captain's command records. They therefore act as a check against the possibility of an IISS ship being used against Imperial interests.

Scouts who have reached retirement age (66 years old) are no longer required to remain on detached-duty status. If they are in possession of a surplus ship, they must turn it in upon retirement.

EXPLORATION OFFICE

This Office is responsible for exploration of new regions of space. It was once the largest of the Offices in manpower and resources, but has dwindled over the centuries. It is divided into the Exploration Branch and the Contact and Liaison Branch.

Exploration Branch performs the actual exploration of previously uncharted star systems. It compiles physical data on planets, studies local life forms, and uncovers unknown hazards to navigation or individuals. Its members tend to be trained in spacecraft handling, planetary survival, and the physical and biological sciences.

The Imperium no longer has open frontiers to expand into, so the Exploration Branch has little left to do. It is most active in the Spinward Marches region, and along the trailing fringes of the Imperium. It also mounts long-range expeditions from time to time, sending them hundreds of parsecs out to explore unclaimed space. Such expeditions are expensive and hazardous, but the Service considers them an investment in the Imperium's future.

Contact and Liaison Branch is charged with making contact with newly discovered foreign cultures. It also helps to maintain friendly relations between the Imperium and non-Imperial societies, by lending scientific support to the Diplomatic Corps. "C&L" members receive training similar to that of their Exploration Branch partners, although their scientific training tends to be in xenology and the social sciences.

Aside from the business of contact, C&L has several additional missions. It is responsible for controlling the dissemination of advanced technology to backward worlds within the Imperium. This usually means *limiting* such technology transfer. The goal of this mission is to minimize damage to local cultures while they are brought into the Imperial mainstream.

C&L Branch is also responsible for oversight of most worlds interdicted on the recommendation of the Scout Service. Such worlds are normally recommended for interdiction after C&L determines that the local culture needs to be protected from any contact with the Imperium.

Unlike the Exploration Branch, C&L is a thriving and busy organization. Almost every world not fully integrated into Imperial culture is regularly visited by C&L personnel, or has a C&L team in permanent residence. These operatives work with local authorities and institutions to keep the process of integration running smoothly. If the locals wish instead to keep Imperial civilization at a distance, C&L will help prevent outsiders from interfering in local affairs. This sometimes makes C&L Branch unpopular with greedy merchants or would-be cultural imperialists. On worlds experiencing internal conflict, Contact and Liaison often finds itself caught in the middle, required to remain neutral even though almost any action will favor one side or the other.

IMPERIAL GRAND SURVEY

The IGS is more properly named "Survey Office," but only the stodgiest members of the Bureaucracy insist in calling it that. It is responsible for producing and maintaining maps of the Galaxy, of individual star systems, and of worlds. It is divided into the Internal Mapping Branch and the External Mapping Branch.

The *Internal Mapping Branch* is responsible for maintaining the Imperium's basic navigational charts and databases. It also maps the surfaces of worlds when necessary. Finally, it places and maintains beacons and other navigational aids. Most of this activity is done from space, in starships specifically designed for survey work. Internal Mapping experts are usually trained in spacecraft handling, astronomy and planetology.

The Imperium has twice mounted comprehensive Grand Surveys of its entire sovereign territory. Even between such rare events, however, Internal Mapping is an active organization. Survey scouts are constantly moving through Imperial space, verifying the most recent Grand Survey results, making any modifications that may be necessary. Such work can require great patience and attention to detail. For example, it isn't unusual for a survey ship to spend a year verifying the orbital paths of several thousand planetoids in a single star system. Somewhat more exciting are the "donation surveys," detailed examinations of a world or star system done as a favor to a local government. For these, Survey teams join with Exploration Branch to do an intensive "work-up" of a star system or individual world.



External Mapping Branch is responsible for maintaining maps of areas outside the Imperium. In peacetime, such maps are often used for navigation, for colonization, or for economic planning. They are also essential in wartime, especially when Imperial forces intend to mount an offensive into enemy-held space. As with Internal Mapping, most of this work is done from space, and the training of its members is similar.

External Mapping can be just as tedious as Internal Mapping, as during a survey of a friendly client state's territory. On the other hand, many of the Imperium's neighbors are more or less hostile, and are likely to object to an Imperial mapping expedition in their territory. Thus, some External Mapping survey ships are specifically designed for stealth, self-defense, and long-range independent operation. External Mapping also works closely with the Intelligence Branch, combing through the reports of espionage assets for astrographic data.

The Promise

Erin stooped low as she entered the tiva. It took the usual moment for her eyes to adapt to darkness, then she made the gesture of respect as best her two-armed physiology would allow. A clicking sound came from the shadows across from the entrance, inviting her to sit and talk.

"Have you reached your decision?" she asked in her best !tunghi, as always having trouble with the clicks and glottal stops.

"Not yet, visitor-female," came the voice. "We do not as yet grasp why we should be concerned about the visitor-others who have come. If they want to take the xighr plants, it means nothing to us. We have no use for the plants ourselves."

Erin suppressed a sigh, remembering in time that the noise would be considered rude. "Wise-female, it may be that you have no use for the xighr now, but that may not always be so. If you allow the visitor-others to harvest, they will come in great numbers. They will take all the xighr, leaving none to grow tall again tomorrow. While they are here, they will ignore your laws and cause much disharmony among the People."

"I have heard you," said the voice. There was a rustling sound, as if the elder shifted her weight on her fiber mat. "The visitor-others will not be here long. Their disharmony will be over quickly once the xighr is gone. Your arguments are like the wind, pleasant to hear but not worth following."

Over and over again, Erin had run up against the same obstacle. The People didn't need the xighr, so they saw no reason why SuSAG shouldn't harvest the plants for rare biochemicals. They had no concept of trade, either, no notion that they could bargain with SuSAG for things they needed. To the People, there was simply no problem, and that tied Erin's hands. Not for the first time, she cursed the short-sighted survey leader who had failed to recommend interdiction status for this world.

"I feel shame that I have not been able to convince you, wise-female," was all Erin said.

"I value your presence, even though I have ignored your arguments," the elder answered. "Will you and your siblings of the Great Monarch's Far-Ranging Voyagers Clan remain?"

"Yes, wise-female," said Erin with conviction. "We will remain, as long as you wish us to. If the time comes when you no longer want the visitor-others among you, we will be here to help you against them. So the laws of our People require."

Xboat Duty

The job of Xboat "pilot" is probably one of the most unusual available in Imperial service.

Express boats are highly optimized for their mission. Each contains a crew compartment, a large bank of computers and data storage, powerful communications equipment, and a jump drive. Notably missing is any maneuver drive beyond simple attitude thrusters. When an express boat arrives in-system, it must wait for a tender to pick it up. Thus, the term "Xboat pilot" is something of a misnomer. Express boat crew are trained in precision astrogation, but their actual piloting skills are rarely used.

The express boat network functions much like the Pony Express of ancient times on Terra. Messages are transmitted to a waiting Xboat, which jumps for the next system down the line. Upon arrival, it immediately transmits its messages to the local Xboat station, which records them and rebroadcasts them to other Xboats for the next leg of the trip. Meanwhile, the Xboat is picked up by a tender for refueling, maintenance, and crew rotation. Eventually, every express boat returns to a way station, where major maintenance and drive overhauls can be performed. There is one way station for every eight to ten Xboat stations throughout the Imperium.

Quarters aboard an express boat are comfortable but cramped. An Xboat crewman spends months in deep space between his rare shore leaves. He spends most of his time alone in jump-space. His ship practically runs itself, so aside from routine checks there is little for him to do. If his ship is attacked, he has nothing but a hand weapon to repel boarders, and no hope at all if the enemy uses ship's guns. It's no surprise that express boat crewmen tend to cultivate a stoic and independent mindset.

There are compensations for this lonely, almost monastic existence. Education Branch allows express boat crew the full range of educational and entertainment programming, on demand. Thus an Xboat pilot has plenty of opportunity to amuse himself or pursue an education. If the GM is using the downtime rules for skill development (see sidebar, p. B82), assume that an Xboat pilot can accumulate up to 40 hours of study per jump without neglecting his duties. This training can apply even to skills that are not related to the pilot's job, but the GM should restrict it to skills that have a significant "book-learning" component.

COMMUNICATIONS OFFICE

One of the Imperium's most important roles is that of an interstellar "postal union," providing for the free flow of information among all of its member worlds. This task is handled by the Communications Office of the IISS. The "Comms Office" handles almost all official interstellar message traffic within the Imperium, and a significant portion of the private traffic as well. It is divided into two branches: the Express Boat Service and the Imperial Courier Service.

The *Express Boat Service* operates express boats and tenders throughout the Imperium, and in those client states served by the Imperial Xboat network. Most of its members are trained in the odd mixture of navigation, engineering, and communication technology that is needed to manage an Xboat in operation. Express Boat Service members have a reputation for self-reliance unusual even for the IISS (see sidebar).

The *Imperial Courier Service* takes up where the Express Boat Service leaves off. The Courier Service carries small cargoes and important personnel which cannot travel by express boat. Meanwhile, the express boat routes are laid out so that few Imperial worlds are more than three or four parsecs from the nearest Xboat station. The ICS carries messages to worlds off the main routes as needed. Finally, the ICS maintains communication links with Imperial diplomatic missions in foreign regions.

Courier Service members receive training in ship handling and communications, but they also develop survival skills since they often visit backward worlds. They tend to cultivate an image as rakish adventurers, daring any peril to deliver the vital data or packages entrusted to them. In reality, their job is only occasionally dangerous, and is sometimes almost as dull as that of an Xboat pilot. Even so, the Imperial Courier Service may have the highest morale of any branch of the IISS.



HISTORY

To understand the Scout Service, one must look back to its roots, in the origins of the Third Imperium and before.

BEFORE THE LONG NIGHT

Among humans, the ideal of wide-ranging exploration first appeared among the Vilani. They were the first human race to reach the stars, and explored space for thousands of years. By the time the Vilani Empire was officially founded, however, the deeply conservative Vilani character had reasserted itself. The First Imperium tended to draw back behind its borders, abandoning exploration. The mere fact that stars existed beyond the boundaries was no longer of any consequence. For example, the Vilani had outposts within a few parsecs of Terra centuries before the Solomani attained space travel. Records show that the Vilani knew of the existence of Terra, and had been overhearing Solomani radio and television transmissions for decades. Yet it appears that the Imperium sent not so much as a cursory survey expedition to investigate.

The Solomani diaspora changed all that. The Solomani who settled new worlds and eventually conquered the Vilani Empire developed an ideal of the *truth*. The new rulers of the Empire came to believe that it was immoral to distort the truth, to conceal it or hide from it. Solomani administrators were determined to discover the truth in the wilderness of their new Empire, and hold to the truth when dealing with each other. Only by keeping those commitments could the vastly outnumbered Solomani rule an Empire full of strange worlds and stranger cultures.

Unfortunately, the Rule of Man never managed perfection in its ideals – not that even perfect idealism could have prevented the final collapse of the Imperium. Eventually, the Long Night fell.

THE SYLEAN FEDERATION

The planet Sylea suffered less than most worlds during the Long Night. It never lost jump-drive technology, so it was able to maintain a few tenuous trade contacts with nearby star systems. Its culture was heavily influenced by the Solomani, and never ceased to look outward. Eventually, Sylea regained the ability and interest to travel beyond their own neighborhood. Under the Sylean Federation (established about -650), explorers began to move out into deep space once more.

The Federation government was tightly centralized, preferring to operate through bureaucratic agencies. This model proved unsatisfactory when it came to the control of exploratory ventures. Successful explorers needed to be highly self-reliant, able to operate on their own for months or years. Thus most ventures were privately mounted at first. Wealthy industrialists searched for new markets or resources. Members of the lower classes looked for places to settle, away from oppressive conditions on Sylea. Adventurers looked for backward worlds to reshape into personal domains. Romantics indulged their wanderlust.

Naturally, exploration and trade led to closer ties between Sylea and its neighbors. By the last decades of the Long Night, the Federation had member worlds scattered throughout Core Sector, though many “pocket empires” and individual worlds remained independent. On the other hand, expansion had put intolerable stress on the structure of the Federation. The bureaucracies were far too rigid, the Grand Senate torn by factions and unable to act. The Federation was on the verge of crisis, apparently doomed to civil war or foreign conquest.

Fatefully, the exploration of space, and the future of the Federation, fell into the hands of one man.

Emergence

There was a small burst of EM and gravitic radiation as the ship dropped out of jump. A few million miles away was a rogue gas giant, orbiting calmly through the dark fringes of the star system, pouring out a flood of radiation noise that ought to cover the telltale signs of arrival. The starship, a flat-black streamlined wedge, immediately went on silent running and listened with passive sensors. No sign of company nearby. Good.

“All right, come about to seventeen by one hundred thirty,” the sensor officer requested. The helmsman nodded and touched his panel.

“How’s reception?” asked the captain, trying not to lean over the sensor station too obviously.

“Coming in five by five.” A flurry of quick adjustments. “Commercial traffic. Entertainment. More commercial. Aha. Here we go.” He touched a key and a raucous squeal poured out over his station’s speakers.

“Military?” asked the captain.

“The coding scheme is strong enough. I’d be willing to take a small wager, Great Captain.”

“No bet. And hang up that Great Captain bit, or I’ll go see the Personnel Officer and stick you with the job.”

“Forget it. I’ve served my time.”

“Start recording, and get the computers working on the encryption. Good hunting,” the captain concluded, and went away to bother someone else.

The sensor officer grinned in anticipation. Forty parsecs behind the Zhodani frontier, the IISS sneak-ship Khimar Amgush was ready to spend six weeks sampling Consulate communications traffic in this important industrial system. Meanwhile, telescopes would find, track and count the tiny flecks of light that represented ships and stations. As long as the turbans didn’t bother scanning this far out, the haul in economic and military intelligence would be considerable.

And if the Zhodani did notice the drifting intruder? Well, then things would get even more exciting . . .

The IISS at War

When a war or other emergency begins, the Detached Duty office goes into high gear. Records Branch calls up the ex-scouts in reserve, assigning them to duties according to their skills and experience. Some of these ex-scouts return to their old branches of the IISS, others are reassigned to new branches, and still others are detailed to the military services. Meanwhile, Intelligence Branch works overtime to gather information relevant to the crisis.

Imperial Grand Survey remains in action during hostilities, augmented by ships and manpower taken from the Exploration Office. IGS is called on to provide up-to-date maps of the conflict zone, including the movements of enemy task forces. To accomplish this, scout ships are armed and formed into reconnaissance squadrons, attached to the Navy.

Communications Office is also busy during wartime. It creates new express-boat and courier routes, keeping Imperial military forces in touch with each other and with high command. Many surplus scout ships and their crews are assigned to Communications during times of emergency.

The other offices maintain IISS operations at a reduced level. In particular, IISS bases and other facilities are usually kept in operation, since they can provide refueling and shipyard facilities for small squadrons. Some branches of the Service are nearly shut down during wartime, so that their personnel can be reassigned as needed.

During wartime, the Scout Fleet is organized into squadrons under IISS command, supporting the Navy. Individual scouts who are detailed to the military services are assigned to specific army, marine or naval units. They receive temporary rank in their new service in accordance with their duties. For example, a Security Branch officer assigned to Naval Intelligence would be given a temporary naval commission, with all the pay and privileges thereof. Naturally, scouts are almost never placed in the line of command in the military services. They usually serve as staff officers or specialists even when they are granted commissioned rank.

FOUNDATION OF THE IMPERIUM

Cleon Zhunastu became hereditary President of the Federation in -30. Cleon was a visionary leader, with great charisma and a rare grasp of politics and human dynamics. He worked to reform or dismantle many of the Federation's institutions, building a new political structure more suited to the task of ruling a great interstellar empire.

One of the first institutions founded by Cleon was the Sylean Federation Scout Service. The Federation's exploratory efforts had always been sporadic and undirected. In contrast, Cleon's new Service would be a tool for the systematic expansion of the Federation. Scouts would push out from the Federation's borders, exploring, updating old charts from before the Long Night, renewing contact with local populations. Strong pocket empires would be located, screened and bypassed. Weaker worlds would be contacted and intensively studied. The lure of advanced Sylean technology would be applied to bring new worlds into the Sylean sphere of influence as quickly as possible.



Cleon had a second motive in founding the Scout Service. He intended it as a test of the kind of decentralized institution he knew would be necessary for the Imperium of his visions. The Service's support structure would be a traditional bureaucracy, but a very lean one. Most of the scouts would operate independently for long periods, relying on competence rather than conformity, teamwork rather than hierarchic control. The new Bureaucracy was recruited mostly from the great corporations of Sylea, while the Field gathered most of its members from the frontier worlds of the Federation.

The mix was an uneasy one from the very beginning. However, Cleon had personally recruited the leadership of both Bureaucracy and Field. He chose sentients who were committed to his vision and determined to make the new Service work. The result met all his expectations. By the Holiday Year, the Service had become one of the most effective institutions of the Federation. In one of Cleon's first acts as Emperor, he renamed it the Imperial Interstellar Scout Service.

In the early years of the Imperium, the scouts operated mostly to coreward and spinward of Sylea. One of Sylea's major allies, the Vilani Confederation, joined the Imperium very early on. This opened a path through Corridor and Deneb sectors into a new frontier area – the Spinward Marches. This region rapidly became a major hub of IISS activity. Scouts discovered many virgin worlds ripe for settlement, and made initial contact with new cultures such as the Zhodani, the Sword Worlds and the Darrians.

Back in the Imperial core, peaceful expansion gave way to a century of frequent warfare (the Pacification Campaigns). The Imperium now consolidated its territory by conquest. Since the Navy was for the first time mounting major offensive campaigns into non-Imperial territory, the IISS was crucial to the war effort.

The wars of Imperial expansion were not always successful from the military standpoint. Even so, the so-called Antebellum period (about 200-600) was a "heroic age" for the Scout Service. It was the time when the Imperium stretched to its current boundaries, mounting not only campaigns of conquest but massive colonization efforts. There was a heady mood of exploration and growth, astrographic and cultural frontiers falling back before the advance of Civilization. The high point of this period came during the reign of the Empress Porfiria. In 298 she integrated the Imperial Grand Survey (originally a separate institution) with the IISS. About twenty years later, she decreed the First Grand Survey of the entire Imperial territory.

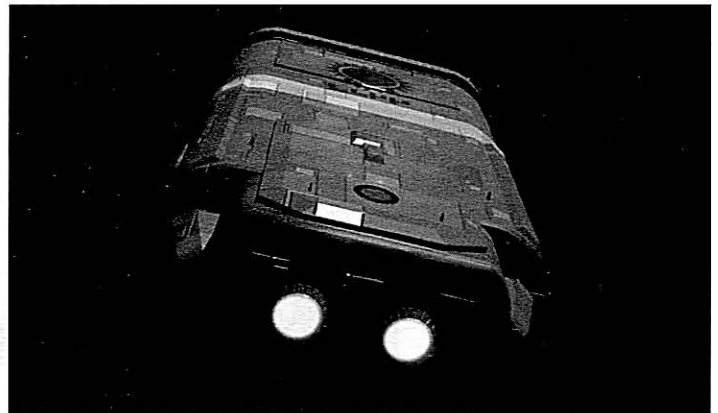
The First Survey was completed in 420, marking a change in the fortunes of the Scout Service. The Imperium had nearly reached the limits of its territorial expansion. Meanwhile, many sectors of the Imperium wanted an end to headlong expansion, in favor of a new emphasis on internal development. Even as the Survey neared completion, rebellion broke out in Ilelish sector, the first of many uprisings and episodes of civil unrest. Imperial society was beginning to fray.

The Empress Jacqueline took note of these trends when she came to the throne in 582. Her administrative style involved a great deal of cost-cutting, and the IISS often felt the bite of her attacks on the Imperial budget. The Service's presence in the Spinward Marches was slashed to the bone, while the Empress turned her attention to the Imperium's rimward frontier. Expansion toward Terra was driven by military considerations, with the IISS involved only in a peripheral role.

Acceptance Speech

"... I should also give due credit to the Imperial Interstellar Scout Service. By assigning me to the Express Boat Service, they placed me in a position of extreme isolation and boredom for six out of the eight years of my career. In such a circumstance, one either succumbs to tedium, or one finds a way to reach the well-springs of creative power that all of us carry hidden. I read, I meditated, I hammered at the anonymous walls, I considered what purpose my life might serve in the Universe. Eventually, I began to write, and that set me on the path that has led me before you today. We rarely consider the ends to which our beginnings might bring us."

*— Dame Ekaterina Ulyanov,
on accepting the Archduke's Medal for
Excellence in Poetry*



A Field Scout Speaks

"People say the Scout Service has lost its shine. No more frontiers, they say. All we have to do now is carry messages and update maps. Well, I'll be the first to tell you that the Service isn't as glamorous as the holovids make it out to be. It's hard work, and sometimes it's boring as hell. But it's important work. You think it's easy, governing the Imperium? Eleven thousand worlds, hundreds of sentient species, trillions of individual beings, not to mention all the rocks and dust in between. The Imperium couldn't keep track of a fraction of it without us. You don't govern an interstellar empire with warships and guns. You govern it with information, and that's our business."

"Besides... no more frontiers? Nonsense. There are a thousand worlds that haven't been seriously explored, that almost no one even visits, just within the Imperium. And then there's the rest of the Galaxy. We'll have to turn outward again someday. There's just too much out there – we can't ignore it."

— Ganidiirsi Sagaruu, xenologist

Scout Service Emblems

Like all the uniformed services, the IISS uses the Imperial sunburst as its primary insignia. The Scout sunburst is blood-red against a black background. The Bureaucracy keeps no other emblem aside from the sunburst, but each of the three Field offices also maintains its own emblem.

The Exploration Office emblem is seven silver stars scattered on a black field, symbolizing the seven Domains of the Imperium. (Early examples used six stars, since the Domain of Deneb was established long after the others.) The motto is *First In* (in coreward portions of the Imperium, this is sometimes given as the Vilani *kimash* or "foremost").

The Imperial Grand Survey emblem is a white galactic spiral tilted almost edge-on, with a pair of golden dividers spanning the width of the spiral, all on a black field. The motto is *Truth and Perseverance*.

The Communications Office emblem is rather different in theme: against a light-colored background, the black silhouette of a human on the back of a running eight-legged beast. The background is white for the Express Boat Service, yellow for the Imperial Courier Service. The motto is *To Enlarge the Common Life*.

The animal in the Communications Office emblem is a *poni*, a riding beast used on Sylea and several other worlds in the Imperial core. It seems that a Sylean history professor of the Civil War period came across references to the Pony Express of ancient Terra. Unfortunately, her knowledge of Old English was faulty and she was unable to make the connection between "pony" and the Terran horse. Although her mistake was soon corrected, the new emblem portrayed the Sylean beast (which was more familiar to most IISS administrators).

IISS field uniforms include service and branch patches. The IISS service patch includes the red-on-black Imperial sunburst above the *poni* from the Communications Office emblem. Exploration Branch uses a single silver star on a black background, with the branch motto inscribed along the left edge. Communications Office, of course, uses its *poni*. Imperial Grand Survey uses an abstract design resembling a lemniscate or "infinity symbol," wrapped around two circles (gold on the left, red on the right).

Jacqueline's reign ended with the disastrous Civil War. The Scout Service was as involved as every other Imperial institution. The scouts of the Spinward Marches supported Olav hault-Plankwell in his march on the Capital, just as they had served under his command during the First Frontier War. In 609, however, both Olav and his betrayer Ramon were slain. IISS Headquarters then issued a directive requiring the Service to remain neutral, waiting for a legitimate Emperor to appear and take command. Although individual scouts and IISS installations sometimes broke this directive, by and large the Service stayed out of the scramble for power. Despite this, the Service was a shadow of its former self, demoralized and divided, scrounging for the funds necessary to keep its facilities and ships operational.

In 616, the Emperor Cleon V appointed Arbellatra Alkalikhoi as Grand Admiral of the Marches, in response to the outbreak of the Second Frontier War. IISS Headquarters accepted Cleon as legitimate, revoked its neutrality directive, and willingly supported both him and Arbellatra. A senior scout named Adrian Eshgaani, who was also a personal friend and advisor to the new Grand Admiral, was posted to the Spinward Marches as Sector Leader.

This move may well have saved the IISS as an institution.



MATURITY OF THE IMPERIUM

Eshgaani was invaluable to Arbellatra during the Second Frontier War. He revitalized the IISS in Deneb and Spinward Marches sectors, turning the dispirited local scouts into an effective intelligence network for Imperial forces. With information gathered by the scouts, Arbellatra was able to mount precisely timed raids in Jewell subsector. This strategy disrupted the enemy's timetable and prevented any large-scale push into Imperial territory. After the war, Eshgaani accompanied Arbellatra back to the Imperial Core, and was at her side during the final campaigns of the Civil War.

The new Regent was painfully aware of the glacial pace of communication between distant sections of the empire. It could easily take over a year and a half for messages to reach Capital from the Spinward Marches. From personal experience, Arbellatra knew how difficult this delay made things for commanders facing crises on the frontiers. She also knew how easily an ambitious admiral could prepare for a march against the Capital, unknown to anyone at the Core until it was too late. If stability was to return to the Imperium, something had to be done.

Her solution, announced in 624, was the express-boat network and the Imperial Courier Service. As planned, the new network would cut communication time to the frontiers by about half, enough to give the Capital a chance to react to a frontier war or an outbreak of imperial ambition. Easier communications would also knit the Imperium together, making it easier for different worlds (or different sectors) to find common interests.

To succeed, the new institution had to be politically neutral. Most of the contracts for the network's construction were given to General Products, a new megacorporation without existing political entanglements. The job of operating the network went to the IISS, under the leadership of Arbellatra's ally Adrian Eshgaani.

Construction of the Xboat network took over a century. The project gave the IISS a new lease on life, as money and manpower flowed into the Express Boat and Courier Services. Even more important, it gave the Service a new symbol to rally around. The frontiers had diminished in importance, but scouts could take up a new task: binding the Imperium together so tightly that the horrors of civil war would never happen again.

About 700, the Service developed the technique of maintaining an extensive roster of "detached duty" operatives. This enabled the Service to become a "flexing" organization, able to reduce costs in ordinary times, yet quickly tap into a pool of skilled manpower when needed. With this step, the modern Service began, a mature institution ready to serve the Imperium for the long term. Expansion efforts would surge and ebb, war and peace would alternate, but the IISS would never again be seriously threatened with extinction.

Scouts Outside the Imperium

The functions performed by the IISS are handled differently by interstellar polities outside the Imperium:

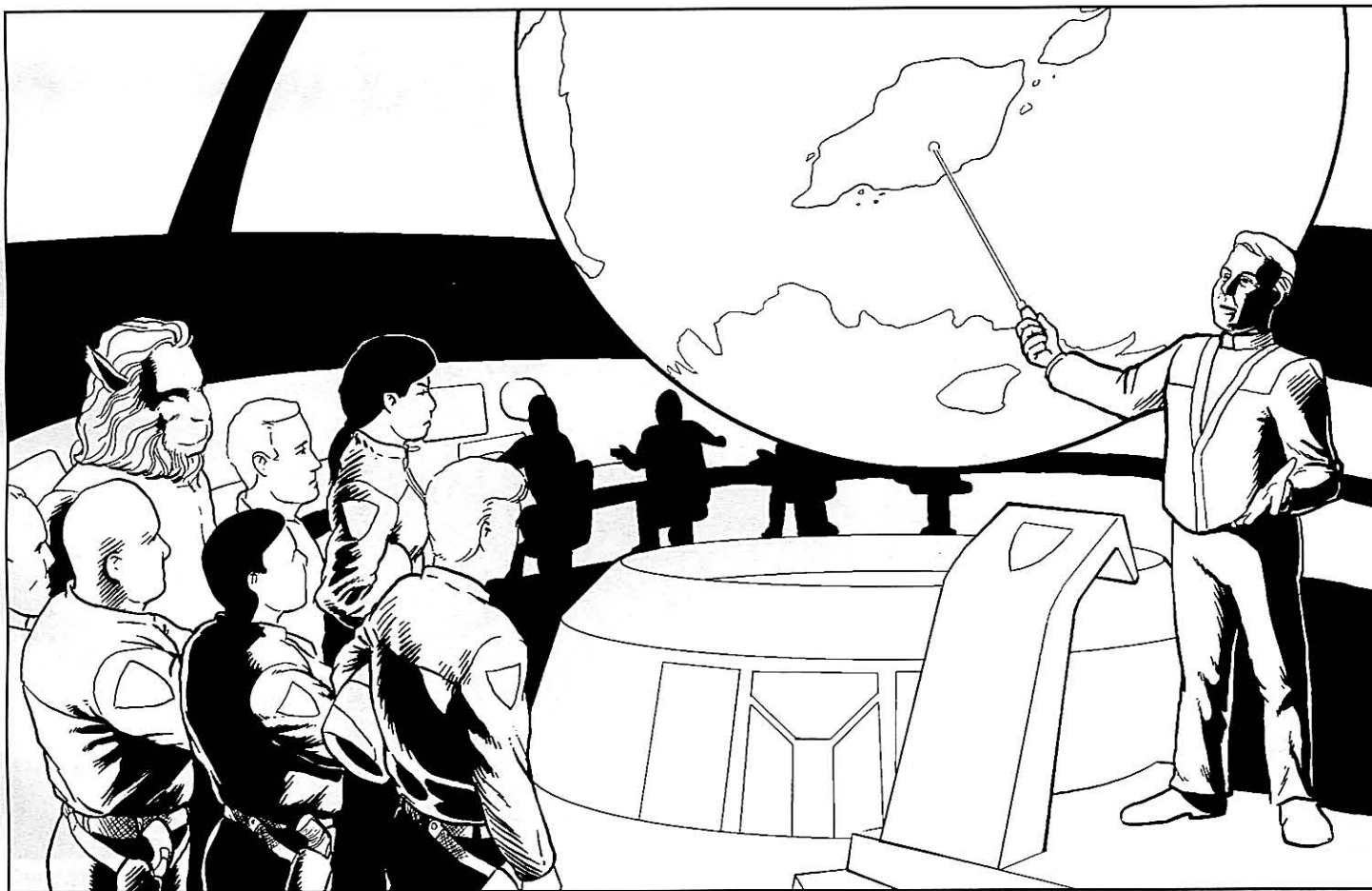
Zhodani Consulate

The Zhodani maintain no distinct equivalent of the Scout Service. Communications are handled by a system of express boats and courier ships, similar to those of the Imperium. Exploration and contact duties are handled by a branch of the Consulate Navy, and many military officers are also ardent explorers. The boundaries of the Consulate itself are static. Nevertheless, in the Core Expeditions the Zhodani are engaged in exploration on a scale that dwarfs any venture in Imperial history.

Vargr Extents

Vargr are often ready to strike out for new territory on a moment's notice. As a result, the Vargr may not explore in any organized fashion, but they do range very widely. Communications in the Extents are handled entirely by private concerns, which carry messages or important cargoes on a commission basis.

Continued on next page . . .



Scouts Outside the Imperium

[Continued]

The Two Thousand Worlds

The K'Kree are extremely incurious and conservative. Their empire expanded very slowly once they attained spaceflight, and all outward exploration halted centuries ago. Merchants and diplomats continue to interact with nearby interstellar powers, but otherwise the Centaurs are uninterested in scouting. The worlds of the K'Kree empire maintain a slow communications network based on interstellar trade.

Hive Federation

The Hivers are probably the only major race to exhibit *more* curiosity than Humaniti. The Federation Development Agency performs many functions that are analogous to IISS missions. The Federation maintains no equivalent of the express-boat network, although the constant circulation of so-called *embassy ships* disseminates information slowly. If faster communications are needed, the Federation Navy or a private concern provide it.

Solomani Confederation

The Solomani government maintains an express-boat network similar to that of the Imperium, and also undertakes exploratory ventures. These functions were once under the strict control of the Confederation Navy. However, the central government's grip has been slowly relaxing ever since the Solomani Rim War. Currently, several major worlds are competing to explore and colonize the Confederation's extensive rimward frontier.

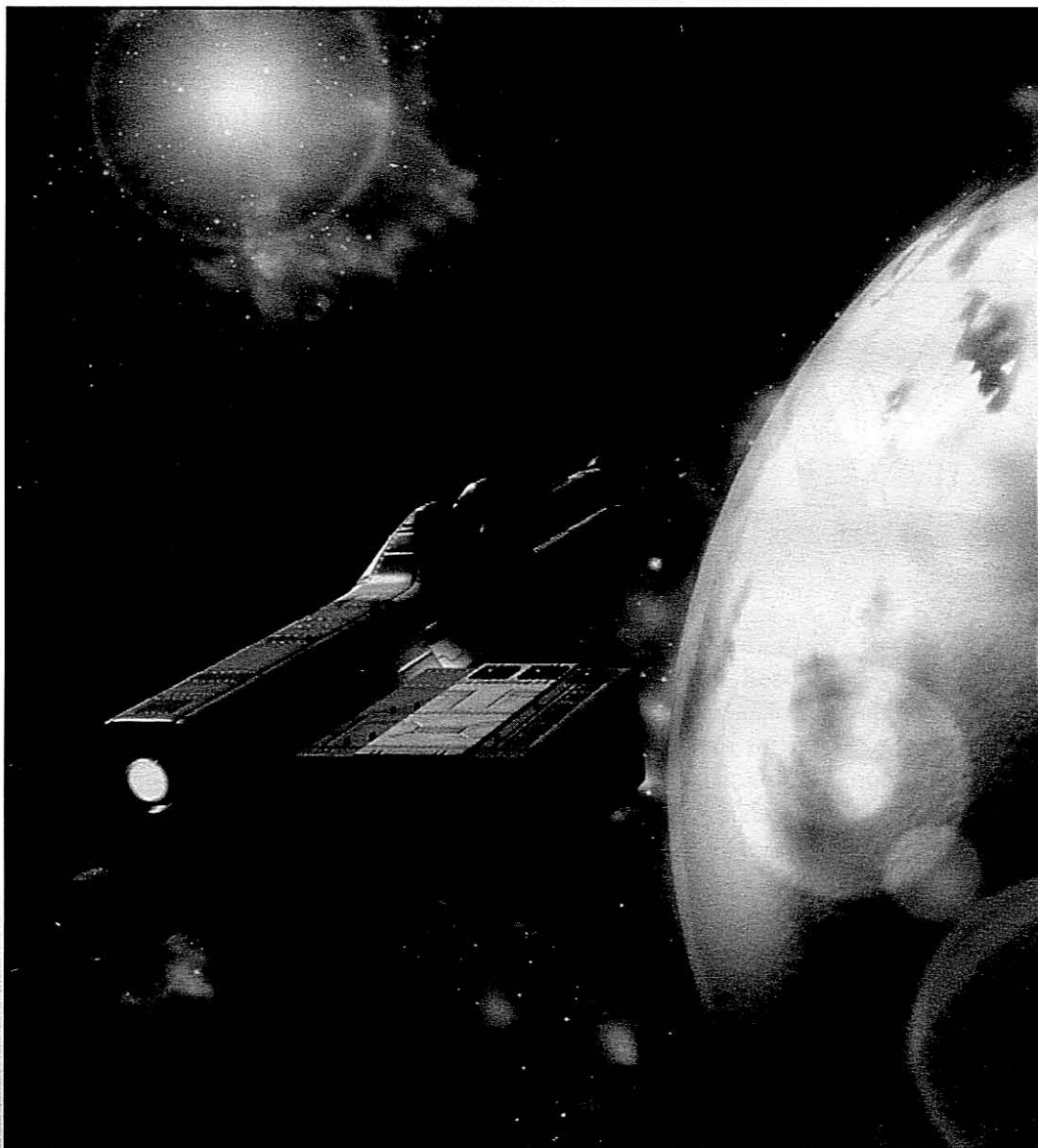
Aslan Hierate

The Aslan have no central government as such, and they don't maintain any equivalent of the express-boat system. Individual clans operate courier services on a for-profit basis. The Aslan are highly motivated explorers. Although they are not overly curious, their territorial hunger more than makes up for it. Bands of *ihatei* don't venture blindly into unknown space if they can avoid it. Instead, they explore carefully to find a good place for their new landholds.

THE PRESENT DAY

The IISS remains critical to the stability of the Imperium. The Express Boat and Courier services are constantly busy, managing the flow of information that is the life-blood of empire. Meanwhile, although the Second Grand Survey was officially completed in 1065, survey work continues even today. Exploration and Survey ships are still filling in details and extending Grand Survey coverage into areas bordering on the Imperium. Meanwhile, Contact and Liaison continues the never-ending task of smoothing interaction between the Imperium's thousands of unique cultures.

The Service's mission of military support has become even more critical in recent years, even in peacetime. The old Imperial strategy of a "crust defense" has proven unworkable. Instead, the bulk of the Imperial Navy now operates as a strategic reserve, relying on colonial forces to delay the first blow of any attacker. Such a strategy requires advance warning and quick response. IISS intelligence and covert operations have therefore expanded considerably in the last 50 years. This growth is especially clear in the Spinward Marches, where Archduke Norris has taken a strong interest in the health of the Scout Service.



Characters

CHARACTER TEMPLATES

The following templates describe *former* members of the IISS, or those on detached duty. Any of them can be converted to a template for active-duty scouts, however. To do this, remove Claim to Hospitality (Former scouts) [10], replace Duty (Reactivation, 9 or less) [-5] with Duty (Scout Service, 15 or less) [-15] and replace Courtesy Rank [1/level] with Administrative Rank [5/level]. If a template does not have Courtesy Rank [1/level] already, add it (limited to Rank 5 or less). The net effect reduces the template's cost by 10 points.

BASE CREWMAN 60 POINTS

You're a citizen of the Imperium from a backwater planet. Before you began your adventuring life, you worked at the local scout base on your home world. That gave you an itch to see other worlds, under other suns. Your time in service also gave you some of the skills you would need to make it out among the stars.

Attributes: ST 10 [0], DX 11 [10], IQ 12 [20], HT 11 [10].

Advantages: A total of 15 points chosen from Claim to Hospitality (Former scouts) [10], Common Sense [10], Courtesy Rank 1-5 [1/level], Fit [5], Intuition [15], Luck [15], Mathematical Ability [10], Sanctity [5], Single-Minded [5], Strong Will [4/level] and Versatile [5].

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -15 points chosen from Code of Honor (Scouts) [-5], Curious [-5 to -15], Honesty [-10], Impulsiveness [-10], Overconfidence [-10], Poverty (Struggling) [-10], Primitive [-5/level], Shyness [-5 to -15], Truthfulness [-5], Uneducated [-5], Workaholic [-5] and Xenophilia [-5 or -15].

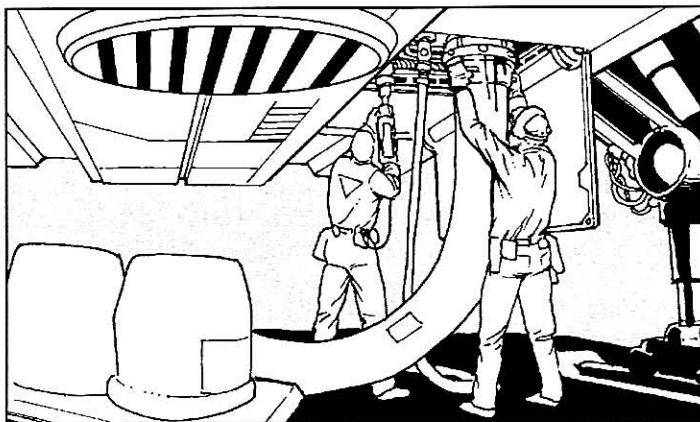
Primary Skills: Mechanic (any) (M/A) IQ+2 [6]-14 and *one* of Computer Operation (M/E) IQ+2 [4]-14 or Electronics Operation (any) (M/A) IQ+1 [4]-13.

Secondary Skills: Administration (M/A) IQ [2]-12, Free Fall (P/A) DX+1 [4]-12, Scrounging (M/E) IQ [1]-12 and Vacc Suit (M/A) IQ [2]-12.

Background Skills: A total of 6 points in Electronics (any) or Engineer (any), both (M/H), Armoury (any), Electronics Operation (any), Mechanic (any), Shipbuilding (Starship), Streetwise or Survival (any), all (M/A), Driving (any) or Piloting (any non-starship), both (P/A), or Beam Weapons (any) or Guns (any), both (P/E).

Customization Notes: This is a relatively cheap template. At least some leftover points should be spent on skills from

the character's home-planet background. Someone from an agricultural world might have Agronomy, low-tech Craft skills, or extra Survival. Someone from a more urbanized environment might have extra Social or Thief/Spy skills. Growing up in the local educational system, a base crewman might have scientific or technical skills based on a lower Tech Level than the Imperial norm.



COURIER 80 POINTS

You're a member of the Imperial Courier Service. You know your way around small, fast starships. Within five minutes of planetfall, you're always ready to investigate the local culture (or at least the local nightlife). You tend to tell tall stories about your time in the Service, since "I delivered the mail" isn't a good brag line in starport bars . . .

Attributes: ST 10 [0], DX 12 [20], IQ 13 [30], HT 11 [10].

Advantages: A total of 20 points chosen from 3D Spatial Sense [10], Claim to Hospitality (Former scouts) [10], Combat Reflexes [15], Common Sense [10], Danger Sense [15], Daredevil [15], Fashion Sense [5], Fit [5], G-Experience [10], Improved G-Tolerance [10], Jack-of-All-Trades [10/level], Luck [15] and Versatile [5].

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -20 points chosen from Code of Honor (Scouts) [-5], Compulsive Carousing [-5], Curious [-5 to -15], Extravagance [-10], Impulsiveness [-10], Overconfidence or Glory Hound [-10 or -15], Workaholic [-5] and Xenophilia [-5 or -15].

Primary Skills: Astrogation (M/A) IQ [2]-13, Electronics Operation (Communications) (M/A) IQ [2]-13, Electronics Operation (Sensors) (M/A) IQ [2]-13 and Piloting (small starships) (P/A) DX+1 [4]-13.

Secondary Skills: Area Knowledge (Galaxy) (M/H) IQ-1 [2]-12, Computer Operation (M/E) IQ-1 [½]-12, Free Fall (P/A) DX [2]-12, Mechanic (J-Drive) (M/A) IQ-1 [1]-12, Mechanic (M-Drive) (M/A) IQ-1 [1]-12, Survival (any) (M/A) IQ-1 [1]-12 and Vacc Suit (M/A) IQ-1 [1]-12.

Background Skills: Astronomy (M/H) IQ-2 [1]-11, Carousing (P/A) HT [2]-11, Streetwise (M/A) IQ-2 [½]-11, plus a total of 3 points in Area Knowledge (any) (M/E), Beam Weapons (any) (P/E), Gambling (M/A), Gunner (any ship-mounted) (P/A), Guns (any) (P/E) or Tactics (M/H).

Customization Notes: Active-duty Couriers involved in high-level diplomatic work may have the Diplomatic Immunity [20] advantage. Couriers tend to be competent while on duty but flamboyant in private, so many Social or Thief/Spy skills may be appropriate.

DEEP-COVER OBSERVER

100 POINTS

You were a deep-cover agent, working for Contact & Liaison or Intelligence Branch, on an interdicted world or beyond the borders of the Imperium. You were an “observer,” not a “spy,” since you were not after military or political intelligence. Your job was to blend in to local society, improving the Service’s understanding of your adopted culture through long-term immersion. It was fascinating work, if stressful, and it left you with a taste for wandering the starlanes.

Attributes: ST 10 [0], DX 13 [30], IQ 13 [30], HT 10 [0].

Advantages: A total of 25 points chosen from Alertness [5/level], Alternate Identity [15], Charisma [5/level], Claim to Hospitality (Former scouts) [10], Collected or Imperturbable [5 or 10], Combat Reflexes [15], Common Sense [10], Cultural Adaptability [25], Danger Sense [15], Intuition [15], Jack-of-All-Trades [10/level], Language Talent [2/level], Luck [15], Panimmunity [10], Sanctity [5], Strong Will [4/level] and Versatile [5].

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -20 points chosen from Curious [-5 to -15], Insomniac [-10 or -15], Light Sleeper [-5], Loner or Reclusive [-5 or -10], Overconfidence [-10], Paranoia [-10], Secret [-5 to -20], Shyness [-5 to -15], Workaholic [-5] or Xenophilia [-5 to -15].

Primary Skills: Acting (M/A) IQ+2 [6]-15, Area Knowledge (target society) (M/E) IQ+1 [2]-14, Fast-Talk (M/A) IQ+2 [6]-15, Language (target society) (M/A) IQ [2]-13, Savoir-Faire (M/E) IQ [1]-13, plus Beam Weapons (any) or Guns (any), both (P/E) DX+2 [1]-15.

Secondary Skills: Area Knowledge (Galaxy) (M/H) IQ-1 [2]-12, Computer Operation (M/E) IQ-1 [½]-12, Diplomacy (M/H) IQ-1 [2]-12, Disguise (M/A) IQ-1 [1]-12, Electronics Operation (Communications) (M/A) IQ-1 [1]-12, Electronics Operation (Sensors) (M/A) IQ-1 [1]-12, Holdout (M/A) IQ-1 [1]-12,

Intelligence Analysis (M/H) IQ-1 [2]-12, Psychology (M/H) IQ-1 [2]-12, Research (M/A) IQ-1 [1]-12 and Stealth (P/A) DX-1 [1]-12.

Background Skills: Anthropology (M/H) IQ-2 [1]-11, Xenology (M/H) IQ-2 [1]-11, *one* of Streetwise or Survival (any), both (M/A) IQ-2 [½]-11, plus 5 points in Economics, History, Law, Literature, Philosophy or Theology, all (M/H), or Merchant or Politics, both (M/A).

Customization Notes: Active-duty observers may have Security Clearance [5/level], probably at level 3. The template largely covers the *social* skills that allow a deep-cover operative to blend in and live within his target culture. That society will have common technical skills, however, which the observer will have to be familiar with. These will likely be from the Combat/Weapon, Professional, or Vehicle skill classes.

* Includes +2 for IQ.



EXPLORATION SCOUT 90 POINTS

You were an archetypal scout, working alone or in a small team, confronting the unknown on a regular basis. Even in this settled era, a certain romance clings to you. Drinking companions will demand your stories, the media on your homeworld will want to interview you. Unfortunately, having made yourself at home on a dozen worlds, you may find it hard to give up the walkabout life.

Attributes: ST 11 [10], DX 11 [10], IQ 13 [30], HT 11 [10].

Advantages: A total of 20 points chosen from Absolute Direction [5], Alertness [5/level], Animal Empathy [5], Charisma [5/level], Claim to Hospitality (Former scouts) [10], Combat Reflexes [15], Common Sense [10], Danger Sense [15], Daredevil [15], Fit [5], G-Experience [10], Improved G-Tolerance [10], Intuition [10], Jack-of-All-Trades [10/level], Language Talent [2/level], Luck [15], Panimmunity [10], Strong Will [4/level], and Versatile [5].

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -20 points chosen from Code of Honor (Scouts) [-5], Curious [-5 to -15], Impulsiveness [-10], Overconfidence [-10], Sense of Duty (indigenous cultures) [-10], Workaholic [-5], and Xenophilia [-5 or -15].

Primary Skills: Cartography (M/A) IQ [2]-13, Electronics Operation (Sensors) (M/A) IQ [2]-13, Survival (any) (M/A) IQ [2]-13, *one* of Driving (any) or Piloting (any), both (P/A) DX+2 [8]-13, and *one* of Astrogation (M/A) IQ [2]-13 or Navigation (M/H) IQ-1 [2]-12.

Secondary Skills: Area Knowledge (Galaxy) (M/H) IQ-1 [2]-12, Computer Operation (M/E) IQ-1 [½]-12, Electronics Operation (Communications) (M/A) IQ-1 [1]-12, First Aid (M/E) IQ-1 [½]-12, Free Fall (P/A) DX+1 [4]-12, and Vacc Suit (M/A) IQ-1 [1]-12, plus *one* of the following:

1. Two of Astronomy, Botany, Chemistry, Ecology, Geology, Mathematics, Paleontology or Physics, all (M/H) IQ-1 [2]-12.
2. *Either* two of Anthropology, Archaeology, Economics, History, Mathematics, Philosophy, Psychology, Theology, or Xenology, all (M/H) IQ-1 [2]-12, *or* Linguistics (M/VH) IQ-1 [4]-12.

Background Skills: Intelligence Analysis (M/H) IQ-2 [1]-11, Planetology (any) (M/A) IQ-2 [½]-11, Xenobiology (any) (M/A) IQ-2 [½]-11, plus a total of 4 points in Area Knowledge (any) (M/A), Beam Weapons (any) (P/E), Diplomacy (M/H), Guns (any) (P/E), Language (any) (M/A), Savoir-Faire (M/E), or Tracking (M/A).

Customization Notes: Scouts choosing secondary skills from set 1 are probably members of the Exploration Branch, while those selecting from set 2 are probably from Contact & Liaison. Exploration scouts are always versatile survivor-types, and are often scientific experts as well. Extra points might be spent on higher levels of skill, or on exotica such as Biochemistry, Genetics, Hyperspace Physics, Nuclear Physics, or Physiology.

INTELLIGENCE OFFICER

95 POINTS

There's a great Game underway, and you were one of the more important pieces. In Intelligence Branch, you coordinated assets, handling the agents who got the information no one else could get. It was dangerous and painstaking work, but it was also fun. Too bad you had to leave. Anyone need an out-of-work spymaster?

Attributes: ST 11 [10], DX 11 [10], IQ 13 [30], HT 11 [10].

Advantages: A total of 25 points chosen from Alertness [5/level], Alternate Identity [15], Claim to Hospitality (Former scouts) [10], Collected or Imperturbable [10 or 15], Combat Reflexes [15], Common Sense [10], Contacts (Any, skill-18, 9 or less, somewhat reliable) [3/contact], Courtesy Rank [1/level], Danger Sense [15], Intuition [15], Language Talent [2/level], Luck [15], Sanctity [5], Strong Will [4/level], Versatile [5] and Zeroed [10].

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -20 points chosen from Code of Honor (Scouts) [-5], Curious [-5 to -15], Enemy (enemy agents, 6 or less) [-15], Light Sleeper [-5], Loner [-5], Mistaken Identity [-5], Nightmares [-5], Overconfidence [-10], Paranoia [-10], Secret [-5 to -20] and Sense of Duty (operatives) [-10].

Primary Skills: Administration (M/A) IQ [2]-13, Computer Operation (M/E) IQ [1]-13, Electronics Operation (Communications) (M/A) IQ [2]-13, Intelligence Analysis (M/H) IQ [4]-13 and Interrogation (M/A) IQ [2]-13.

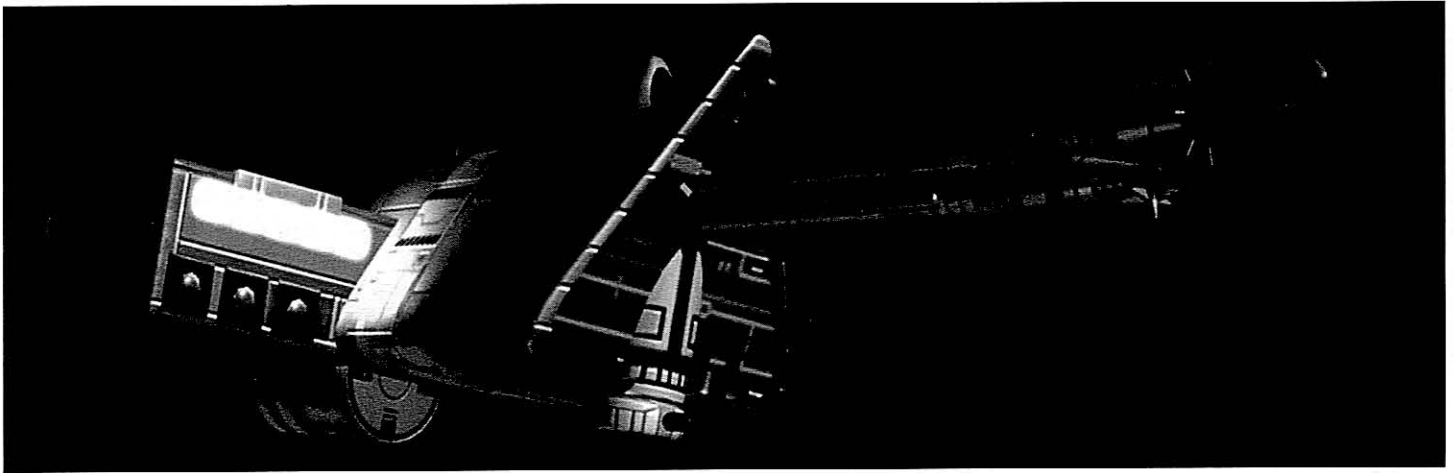
Secondary Skills: Acting (M/A) IQ-1 [1]-12, Area Knowledge (Galaxy) (M/H) IQ-1 [2]-12, Detect Lies (M/H) IQ-1 [2]-12, Electronics Operation (Sensors) (M/A) IQ-1 [1]-12, Fast-Talk (M/A) IQ-1 [1]-12, Photography (M/A) IQ-1 [1]-12, Research (M/A) IQ-1 [1]-12, Savoir-Faire (M/E) IQ-1 [½]-12, Traffic Analysis (M/H) IQ-1 [2]-12, and *one* of Beam Weapons (any) or Guns (any), both (P/E) DX+1 [½]-14.

Background Skills: Carousing (P/A) HT+1 [4]-11, Psychology (M/H) IQ-2 [1]-11, and a total of 7 points in Cartography (M/A), Computer Programming (M/H), Cryptanalysis (M/H), Cryptology (M/H), Driving (any) (P/A), Forgery (M/H), Heraldry (M/A), Piloting (any) (P/A), or SIG-INT Collection/ Jamming (M/H).

Customization Notes: Active-duty Intelligence officers will have Security Clearance [5/level], probably at level 2 or 3. An Intelligence officer often specializes in some subject relevant to the information he has been assigned to help collect. This may imply Area Knowledge, professional skills such as Law or Politics, or technical skills.

* Includes +2 for IQ.





PERSONNEL OFFICER

75 POINTS

Okay, so you were a bureaucrat. You still know people better than anyone. You know how to make contacts, motivate colleagues, teach skills, find resources, get things done. Sure, the group has people who know how to drive starships and handle guns. Do they have someone who can form a coherent sentence?

Attributes: ST 10 [0], DX 11 [10], IQ 13 [30], HT 10 [0].

Advantages: A total of 25 points chosen from Charisma [5/level], Claim to Hospitality (Former scouts) [10], Common Sense [10], Contacts (Military, skill-18, 9 or less, usually reliable) [6/contact], Courtesy Rank [1/level], Empathy [15], Imperturbable or Unfazeable [10 or 15], Intuition [15], Sanctity [5], and Strong Will [4/level].

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -20 points chosen from Code of Honor (Scouts) [-5], Curious [-5 to -15], Honesty [-10], Impulsiveness [-10], Sense of Duty [-5 to -20], Workaholic [-5] and Xenophilia [-5 or -15].

Primary Skills: Administration (M/A) IQ+1 [4]-14, Computer Operation (M/E) IQ+1 [2]-14, Savoir-Faire (Military) IQ [1]-13, and *either* Diplomacy (M/H) IQ [4]-13 *or* Teaching (M/A) IQ+1 [4]-14.

Secondary Skills: Area Knowledge (Galaxy) (M/H) IQ-1 [2]-12, Electronics Operation (Communications) (M/A) IQ-1 [1]-12, Fast-Talk (M/A) IQ-1 [1]-12, Free Fall (P/A) DX+1 [4]-12, Politics (M/A) IQ-1 [1]-11, Vacc Suit (M/A) IQ-1 [1]-12, and *one* of Driving (any) or Piloting (any non-spacecraft), both (P/A) DX+1 [4]-12.

Background Skills: Carousing (P/A) HT+1 [4]-11, Leadership (M/A) IQ-2 [½]-11, Psychology (M/H) IQ-2 [1]-11, Streetwise (M/A) IQ-2 [½]-11, plus 4 points in Area Knowledge (any) (M/E), Beam Weapons (any) (P/E), Guns (any) (P/E), or Language (any) (M/A).

Customization Notes: Personnel officers who are travelling on their own may need extra skills to give them some combat, ship-handling, or survival ability. Their main focus is on people, however, so some extra points should probably go into Social or Thief/Spy skills.

S-3 OPERATIVE

130 POINTS

You were a member of the Special Security Service. Who needs Marines? You were the fastest, the quietest, the best at blending into the background, the best at winning victories without shedding a drop of blood. You were subtle. Marines are many things, some of them very worthwhile, but they are *not* subtle.

Attributes: ST 11 [10], DX 13 [30], IQ 13 [30], HT 11 [10].

Advantages: Combat Reflexes [15], Fit [5], G-Experience [10] and a total of 10 points chosen from 3D Spatial Sense [10], Alertness [5/level], Claim to Hospitality (Former scouts) [10], Common Sense [10], Courtesy Rank 1-5 [1/level], Fearlessness [2/level], High Pain Threshold [10], Improved G-Tolerance [10], Jack-of-All-Trades [10/level], Strong Will [4/level], Toughness [10], Versatile [5] and Very Fit [10] (adds to cost of Fit).

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -20 points chosen from Code of Honor (Scouts) [-5], Fanaticism (Imperial patriot) [-15], Overconfidence or Glory Hound [-10 or -15], Sense of Duty (fellow Scouts) [-10], Stubbornness [-5] and Workaholic [-5].

Primary Skills: *Two* Beam Weapons or Guns skills, each (P/E) DX+2 [1]-15*, plus Free Fall (P/A) DX+1 [4]-14, Savoir-Faire (Military) (M/E) IQ [1]-13, Tactics (M/H) IQ [4]-13, Vacc Suit (M/A) IQ [2]-13, and *one* of Judo or Karate, both (P/H) DX [4]-13.

Secondary Skills: Armoury (Small arms) (M/A) IQ-1 [1]-12, Battlesuit (P/A) DX-1 [1]-12, Camouflage (M/E) IQ-1 [½]-12, Computer Operation (M/E) IQ-1 [½]-12, Electronics Operation (Communications) (M/A) IQ-1 [1]-12, Electronics Operation (Sensors) (M/A) IQ-1 [1]-12, Engineer (Combat) (M/H) IQ-1 [2]-12, First Aid (M/E) IQ-1 [½]-12, Gesture (M/E) IQ-1 [½]-12, Knife (P/E) DX-1 [½]-12, Scrounging (M/E) IQ-1 [½]-12, Traps (M/A) IQ-1 [1]-12, *one* of Broadsword, Shortsword or Spear, all (P/A) DX-1 [1]-12, and *one* of Driving (any) or Piloting (any), both (P/A) DX-1 [1]-12.

Background Skills: Administration (M/A) IQ-2 [½]-11, Leadership (M/A) IQ-2 [½]-11, Planetology (any) (M/A) IQ-2 [½]-11, Psychology (M/H) IQ-2 [1]-11, Stealth (M/A) DX-2 [½]-11, Xenology (M/H) IQ-2

[1]-11, and 2 points in Languages (any) or Survival (any), both (M/A).

Customization Notes: There is very little choice in background skills here. S-3 operatives should have no physical disadvantages, unless they acquired them by being wounded in the line of duty.

* Includes +2 for IQ.

SECURITY OFFICER 90 POINTS

You were in Security Branch, not one of those S-3 hot-shots, just a policeman on the beat. You weren't trained for combat, exactly, although on the frontier the people you arrested weren't always willing to come along peacefully.

Attributes: ST 11 [10], DX 12 [20], IQ 12 [20], HT 10 [0].

Advantages: A total of 20 points chosen from Alertness [5/level], Claim to Hospitality (Former scouts) [10], Courtesy Rank [1/level], Combat Reflexes [15], Contacts (Military, skill-18, 9 or less, usually reliable) [6/contact], Fearlessness [2/level], Fit [5], Danger Sense [15], Intuition [15], Legal Enforcement Powers [5], Strong Will [4/level], and Versatile [5].

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -20 points chosen from Code of Honor (Scouts) [-5], Cannot Harm Innocents [-10], Curious [-5 to -15], Enemy (criminal interests, 6 or less) [-15], Honesty [-10], Intolerance (criminals) [-5], Impulsiveness [-10], Overconfidence [-10], Sense of Duty [-5 to -20], and Workaholic [-5].

Primary Skills: Judo (P/H) DX+1 [8]-13, Law Enforcement (M/A) IQ+2 [6]-14, and *one* of Beam Weapons (any) or Guns (any), both (P/E) DX+2 [1]-14.

Secondary Skills: Administration (M/A) IQ [2]-12, Computer Operation (M/E) IQ [1]-12, Criminology (M/A) IQ [2]-12, Electronics Operation (Communications) (M/A) IQ [2]-12, Electronics Operation (Sensors) (M/A) IQ [2]-12, Free Fall (P/A) DX [2]-12, Research (M/A) IQ [2]-12, Savoir-Faire (Military) (M/E) IQ [1]-12, Vacc Suit (M/A) IQ [2]-12, and *one* of Driving (any) or Piloting (any), both (P/A) DX [2]-12.

Background Skills: Area Knowledge (Galaxy) (M/H) IQ-1 [2]-11, Interrogation (M/A) IQ-1 [1]-11, Intimidation (M/A) IQ-1 [1]-11, Psychology (M/H) IQ-1 [2]-11, Streetwise (M/A) IQ-1 [1]-11, plus a total of 5 points in Area Knowledge (any) (M/A), Armoury (any) (M/A), Gunnery (any) (P/A), Intelligence Analysis (M/H), Language (any) (M/A), Law (M/H), Leadership (M/A), or Tactics (M/H).

Customization Notes: The Legal Enforcement Powers for a former member of Security Branch is equivalent to an Imperial weapons permit, allowing the ex-scout to carry a concealed weapon in certain areas when others legally can't. An active-duty Security officer would automatically have 10 points of Legal Enforcement Powers (see p. 7). IISS Security officers don't tend to be combat monsters, instead thinking their way through difficult situations. Extra points are as likely to be spent on Social, Thief/Spy, or even Science skills as on combat.

SURVEY SCOUT 80 POINTS

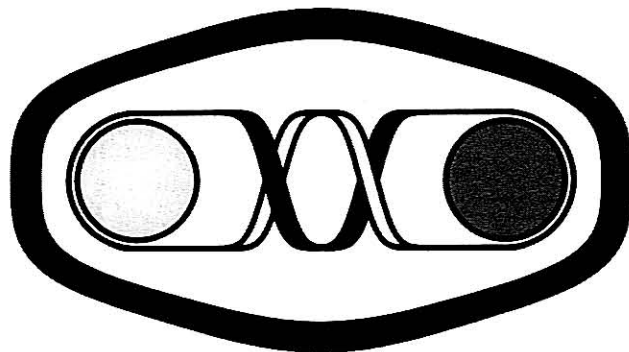
You were a member of the Imperial Grand Survey. You know your way around ships and sensors better than anyone else in space, and you're not shy about the fact. You get along well with people, as long as no one makes that joke about "counting rocks."

Attributes: ST 10 [0], DX 11 [10], IQ 13 [30], HT 11 [10].

Advantages: A total of 20 points chosen from 3D Spatial Sense [10], Claim to Hospitality (Former scouts) [10], Collected or Imperturbable [5 or 10], G-Experience [10], Improved G-Tolerance [10], Single-Minded [5], Strong Will [4/level] and Versatile [5].

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -20 points chosen from Code of Honor (Scouts) [-5], Curious [-5 to -15], Loner or Reclusive [-5 or -10], Shyness [-5 to -15], Stubbornness [-5] and Workaholic [-5].

Primary Skills: Cartography (M/A) IQ+2 [6]-15, Electronics Operation (Sensors) (M/A) IQ+1 [4]-14, and Surveying (M/A) IQ [2]-13.



Secondary Skills: Area Knowledge (Galaxy) (M/H) IQ-1 [2]-12, Astrogation (M/A) IQ-1 [1]-12, Computer Operation (M/E) IQ-1 [½]-12, Electronics Operation (Communications) (M/A) IQ-1 [1]-12, Free Fall (P/A) DX+1 [4]-12, Photography (M/A) IQ-1 [1]-12, Piloting (small starship) (P/A) DX+1 [4]-12, Vacc Suit (M/A) IQ-1 [1]-12.

Background Skills: Astronomy (M/H) IQ-2 [1]-11, First Aid (M/E) IQ-1 [½]-12, Intelligence Analysis (M/H) IQ-2 [1]-11, Navigation (M/H) IQ-2 [1]-11, Planetology (any) (M/A) IQ-2 [½]-11, Survival (any) (M/A) IQ-2 [½]-11, plus a total of 4 points in Area Knowledge (any) (M/E), Beam Weapons (any) (P/E), Guns (any) (P/E), Gunnery (any ship-mounted) (P/A), Mechanic (J-Drive or M-Drive) (M/A).

Customization Notes: The requirements of the Imperial Grand Survey are fairly constant, but its members probably travel around more than almost any other scouts. Use extra Area Knowledge, Planetology and Survival skills to reflect the places your scout has been. Survey scouts also have a habit of heavy carousing when they get shore leave, so additional Social or Thief/Spy skills may come in handy.

* Includes +2 for IQ.

XBOAT PILOT

80 POINTS

You are a graduate of the Express Boat Service. As such, you've got skills that are in demand. You've also got a reputation for being a little off the deep end, but there are plenty of employers who don't care about that as long as you get the job done.

Attributes: ST 10 [0], DX 12 [20], IQ 13 [30], HT 11 [10].

Advantages: A total of 20 points chosen from 3D Spatial Sense [10], Claim to Hospitality (Former scouts) [10], Collected or Imperturbable [5 or 10], G-Experience [10], Improved G-Tolerance [10], Strong Will [4/level] and Single-Minded [5].

Disadvantages: Duty (Reactivation, 9 or less) [-5] and a total of -20 points chosen from Code of Honor (Scouts) [-5], Loner or Reclusive [-5 or -10], No Sense of Humor [-10], Reputation (Eccentric) [-5/level], Shyness [-5 to -15], Stubbornness [-5] and Workaholic [-5].

Primary Skills: Astrogration (M/A) IQ+2 [6]-15, Computer

Operation (M/E) IQ [1]-13, Electronics Operation (Communications) (M/A) IQ [2]-13, Electronics Operation (Sensors) (M/A) IQ [2]-13, and Mechanic (J-Drive) (M/A) IQ [2]-13.

Secondary Skills: Area Knowledge (Galaxy) (M/H) IQ-1.

Disadvantages: [2]-12, Free Fall (P/A) DX [2]-12, Guns (any) (P/E) DX+2 [1]-14, Piloting (small starship) (P/A) DX [2]-12 and Vacc Suit (M/A) IQ-1 [1]-12.

Background Skills: Astronomy (M/H) IQ-2 [1]-11 and a total of 3 points in Area Knowledge (any) (M/E), Artist (M/H), Beam Weapons (any) (M/E), Meditation (M/H), Musical Composition (M/H), Musical Instrument (any) (M/H), Poetry (M/A), Sculpting (P/A), or Writing (M/A).

Customization Notes: By itself, the template includes adequate (but rather one-sided) shipboard skills. Extra points might be spent to round those out, or emphasis might be put on the background skills which represent what the pilot did during his off-duty hours.

* Includes +2 for IQ.

ADVANTAGES

Administrative Rank

see p. C119

The IISS is not a military organization, so none of its members hold Military Rank. Members of the Bureaucracy, however, can hold Administrative Rank reflecting their level of authority and responsibility. See *Ranks and Pay Grades* below for a detailed description of the Service's rank structure. Rank in the IISS does not entitle one to military honors, but it does bring informal respect and deference from others in the Imperial service.



Claim to Hospitality

see p. C121

Retired and detached-duty scouts may be granted official lodging privileges at IISS facilities throughout the Imperium. The scout may stay in guest quarters and use recreational facilities on-base for free, as long as space is available. The Service also encourages an informal hospitality network. Thus, even if space is not available at the nearest IISS base, an ex-scout with this advantage may be able to get a list of others living in the area, who will be able to house him for a short time. This service isn't coercive. An ex-scout doesn't have to make himself available for the network, although he must do so if he expects to be able to take advantage of it himself.

Courtesy Rank

see p. C123

Field scouts on *active duty* will hold Courtesy Rank in accordance with their expertise and authority. When the Field scout is operating as part of a team including members of the Bureaucracy, the Courtesy Rank acts as a "place-holder" to indicate his current position in the chain of command. It holds no other function and does not entitle the scout to military honors. Field scouts never hold Courtesy Rank higher than level 6.

Meanwhile, retired and detached-duty scouts may hold Courtesy Rank if they held some level of Administrative Rank while on active duty in the Bureaucracy (see above).

Legal Enforcement Powers

see p. B21

Active-duty members of the Security Office often have this advantage because of their duty to enforce the interdiction laws. Such officers have full Imperial authority and can override or demand the cooperation of local authorities. They also have broad powers to engage in covert investigations. This level of Legal Enforcement Powers is worth 10 points.

Reputation see p. B17

The culture of the Field places a lot of emphasis on individual excellence. Field scouts can easily earn a Reputation within the IISS, on the basis of technical expertise or missions accomplished. As scattered as the Service is, of course, it would be very unusual for anyone to be recognized more often than "sometimes" (10 or less).

Security Clearance see p. C129

For the purposes of character design, assume that the IISS recognizes three levels of security clearance. Level 1 is "Confidential" clearance, access to information which is classified but not particularly sensitive. Level 2 is "Secret" clearance, access to information which would do substantial harm to Imperial interests if revealed. Level 3 is "Most Secret" clearance, access to information which would do severe harm to Imperial interests if revealed. Most Secret clearance is probably required for deep-cover spies, important analysts, and policy-makers. Minor functionaries in the Intelligence apparatus can do with lower levels of clearance.

Ship Patron see p. GT84

Detached-duty scouts who have served at least 12 years on active duty may be assigned a surplus *Suleiman*-class scout/courier vessel. This can be considered an extension of the Claim to Hospitality (see above) for scouts who are considered more important by the Detached Duty Office. See sidebar, p. 10 for details of the obligation assumed by a scout with such a Ship Patron.

Status see p. B18

Although the Imperial nobility certainly recognizes the Scout Service as an important institution, few scions of the noble houses enlist in it. One reason for this may be the internal culture of the IISS, which discourages class consciousness in favor of an egalitarian atmosphere of teamwork. Whatever the reason, even members of the Bureaucracy do not automatically earn Social Status with higher rank. Many scouts have been knighted, but few have ever been granted entry into the peerage in exchange for their service.

DISADVANTAGES

Code of Honor (Scouts) see p. B31

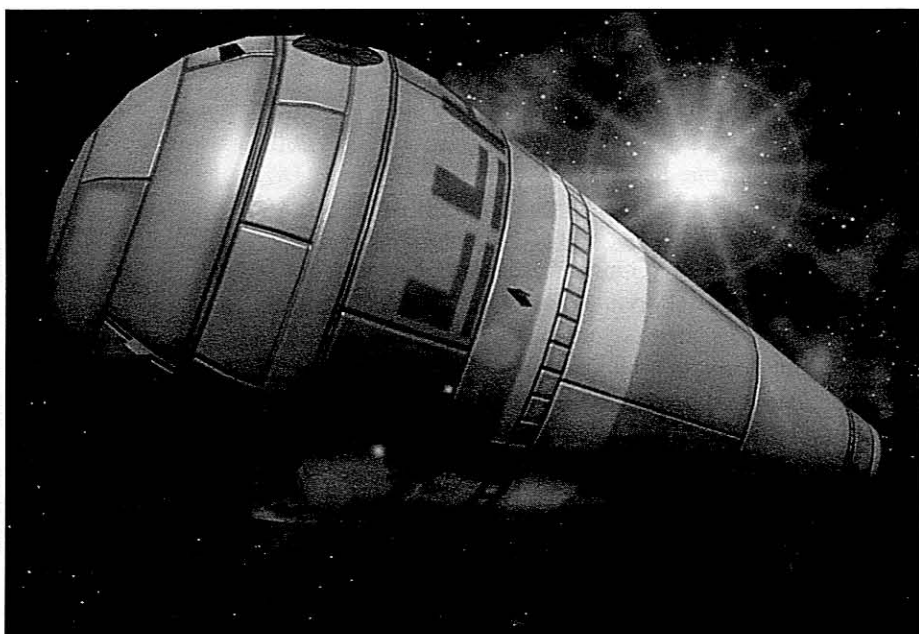
Aside from the usual requirements of Imperial service, the IISS instills a certain personal code of conduct into its recruits. An ideal Scout never gives any mission less than his full effort once he has accepted it. He is expected to exercise initiative, and operate without orders when necessary. He is also expected to accept the consequences of his decisions, whether good or bad, without flinching. Not all Scouts subscribe to this Code of Honor, but almost all Field scouts do. This specific Code is worth -5 points.

Duty (Reactivation) see p. B39

Almost all detached-duty scouts have this disadvantage at a 5-point level, implying that the Duty will appear on a 9 or less in any given session. This does not necessarily mean a major commitment of time, such as might keep the character out of the current adventure. Most often, the IISS will call the scout in for a *short* return to active duty. Perhaps he is reporting to an Intelligence Branch officer on what he's seen over the last few months. Or maybe he is needed to brief other scouts on a world he visited years before. Or he has technical skills that are needed in the short term by an IISS team on the same world. In any case, the GM can use the Duty as a way to provide background information to his players . . . or as a plot hook!

Social Stigma (Robot) see p. B27

The IISS often makes use of robots in the course of its mission, and in fact Scout robots are often the most intelligent and self-directed to be found in Imperial service. It is possible for a Scouts campaign to use robots as *characters* (using the appropriate rules from *GURPS Robots*). If so, any robot (whether NPC or PC) must take this Social Stigma as a disadvantage while operating within Imperial society (see p. GT18). It is equivalent to the *valuable property* Social Stigma from the *Basic Set*, and is worth -10 points.



SKILLS

Battlesuit

see p. B49

Battlesuits using gravitic technology can easily be made air-mobile. Use Battlesuit skill for flying battlesuits so long as they are grounded, but use Piloting (Grav Belt) in the air. A scout with Battlesuit skill should also have the Piloting specialty.



RANK AND PAY GRADES

The IISS Bureaucracy uses a ladder of ranks and pay grades to fill out its hierarchy. These ranks are similar to those of the military services, but they don't carry the same weight of military protocol. Scout characters use Administrative Rank (see p. 24) to represent rank in the IISS. Most scouts in the Bureaucracy use a ladder of titles unique to the Service. The exception is Security Branch, which has a more military tradition and uses traditional military titles up to the rank of Colonel. Higher ranks use the common Bureaucracy titles, although it is rare for someone to reach these ranks while remaining in Security Branch. Security Branch uses the same pay scale as the rest of the Service.

Refer to the *Rank and Pay Grade Table* to see how the various ranks stack up. Monthly salaries are given for each rank. Scouts tend to be relatively well-paid compared to members of the military services. Note that a detached-duty scout who is called up for a short term of active duty will normally be paid according to the rank he held when he went on detached duty. As a courtesy, the scout is paid for a full day even if his term of duty was only a few hours.

Rank and Pay Grade Table

Rank	Title (Security Branch Title)	Salary
0	Recruit (Private)	300
	Apprentice (Lance Corporal)	400
	Journeyman (Corporal)	500
1	Skilled Worker (Lance Sergeant)	600
	Assistant Team Leader (Sergeant)	650
	Team Leader (Gunnery Sergeant)	700
2	Assistant Supervisor (Lead Sergeant)	800
	Supervisor (First Sergeant)	900
	Senior Supervisor (Sergeant Major)	1,200
3	Admin Trainee (Second Lieutenant)	1,200
	Junior Administrator (First Lieutenant)	1,400
4	Administrator (Captain)	1,600
	Group Administrator (Major)	1,800
5	Senior Administrator (Lieutenant Colonel)	2,000
6	Scout Commander (Colonel)	2,400
7	Scout Leader	2,800
	Senior Scout Leader	3,200
8	Sector Scout Leader	4,000

Cryptanalysis

see p. B245

High-tech civilizations all face the problem of encoding words, sounds or images in digital form. The exact codes (or *protocols*) used vary widely, so scout teams which intercept an alien civilization's transmissions often need to strip away a new encoding scheme to get to the meaningful content. Such transmissions are not encrypted in the strict sense, but scouts can use Cryptanalysis to figure out any new digital communications protocol. The GM must determine the difficulty of any such attempt.

Rank-0 scouts are new recruits into the Bureaucracy, without any prior education that would suit them for serious responsibilities right away. They are in a training phase of their career, up to the rank of Journeyman.

Rank-1 scouts (Skilled Workers and Team Leaders) have been in the Service for several years, and can be given greater responsibilities. They may have a highly technical position or be in charge of the day-to-day operation of a small team. These are roughly equivalent to junior NCOs in the military services.

"I don't know why everybody says the Scouts don't have ranks. Anyone who has ever been inside an express boat cockpit towards the end of a trip can tell you that Scouts can be very rank!"

— Comedian Anton Wilson Peale



Rank-2 scouts (Supervisors) are senior members of the Service, with plenty of skills and experience. They are not in the direct chain of command, but they often oversee the routine operations of very large teams.

Rank-3 scouts (Junior Administrators) are the least senior ones actually on the "management track," equivalent to Lieutenants in the military services. They may have a good technical education, but they lack experience and will lean heavily on the Team Leaders and Supervisors in their office.

Rank-4 scouts (Administrators) are the middle-management of the Scout Service. They may be the final authority for relatively large teams of scouts (up to a few dozen), or they may be senior staff at a subsector's most important IISS facility. For many small IISS bases, an Administrator is the seniormost official present.

Rank-5 scouts (Senior Administrators) are in charge of larger facilities, or may be senior staff at IISS sector headquarters.

Rank-6 scouts (Scout Commanders) are the senior-most ones normally seen in the field. They command very large IISS vessels, such as the *Pytheas*-class exploratory cruiser (see p. 37). They can also be placed in charge of large-scale IISS missions, such as the squadron enforcing an interdiction blockade. They may also be in charge of very large IISS bases or way stations.



Rank-7 scouts (Scout Leaders) are placed in command of all IISS operations in a subsector. Scouts at this rank with more experience are assigned to important subsectors, such as potential war zones or regions including "difficult" interdicted worlds.

Rank-8 scouts (Sector Scout Leaders) are in command of IISS operations in an entire sector. They have subtle, but wide-ranging, influence on Imperial policy throughout their jurisdiction. A small group of these scouts forms the nucleus of IISS Headquarters in Core sector.

Scouts in the Field offices do not hold formal rank, although while on active duty they will hold Courtesy Rank to indicate their relative seniority with respect to the Bureaucracy. A Field scout's pay grade is roughly equivalent to that of a ranked scout with equal seniority. For example, a member of the Exploration Office has level 4 Courtesy Rank. He is paid about the same as an Administrator. If he joined a team including members of the Bureaucracy, he could be given a technical position at the same level as an Administrator. He would not be in the chain of command, and would not be treated as the equal of a military or IISS officer in a protocol situation.

EQUIPMENT

WEAPONS

Scouts on duty tend to use the same weapons as a light infantry unit: rifle, ACR, laser carbine or rifle. They rarely carry heavy weapons such as plasma or fusion guns. Instead, they are likely to use nonlethal weapons.

For example, scouts are often faced with the problem of capturing an animal (or a person) without injury. One solution is tranq rounds in standard rifles (see p. GT111).

PERSONAL EQUIPMENT

■ **Chronometer (TL8):** A scout's timepiece keeps Imperial standard time, and can also be quickly programmed to keep time in accordance with any planet's rotation and orbital periods. The display can be set to show up to three different time standards at once. Works on an A cell for one year. Cr100, 0.5 pounds.

- **Covert Action Communicator (TL12):** This is a tiny radio communicator, the size of a small coin, which is normally worn next to the user's skin at the base of his throat. It acts as a very short-range communicator with a range of about fifty miles, enough to reach a backup team in hiding or a ship in low orbit. The user may subvocalize into it, communicating without moving his lips. Cr100, weight negligible.
- **Emergency Beacon (TL9):** A specialized communicator and signal transponder. When activated, the beacon waits for transmissions on standard emergency channels, presumably from a search party. When it detects them, it responds with a strong coded distress signal and can then open communication between its user and the rescuing party. The device can operate for up to 1 year on an A cell in passive mode. Cr1,000, 2 pounds.



■ **Goodwill Kit (TL10):** Since its earliest days, the IISS has used these kits to gain entry into “primitive” societies (i.e., anything from TL5 down). The kit comes in a secure shoulder case, and includes items such as microchip voice recorders, synthetic gemstones, high-quality steel blades, candy, simple medical drugs, heat-sensitive fabric dyes, and other simple items that are likely to impress members of a pre-industrial culture. Even the canister can be used as a sealed food container or water sack. The highly unofficial term for this item is the “Amaze-the-Natives Kit.” Cr200, 20 pounds.

■ **Laser Communicator (TL8):** A field laser communicator is often used by scout teams when radio transmissions might be intercepted. The laser device is mounted on a sturdy tripod to make it easy to maintain aim. It has a range of 10 miles at TL8 (100 miles at TL9, 500 miles at TL10+) but is restricted to line-of-sight. Works for 1 hour on an A cell (assuming continuous transmission). Cr650, 5 pounds.

■ **Medscanner (TL9):** A compact scanner with a dedicated medical computer, designed to make detailed diagnoses when used by a trained physician on a known species. The medscanner’s detachable probe must be placed in contact with the patient’s skin, preferably over the chest (or other site near the vital organs). On a successful Electronics Operation (Medical) roll it adds +3 to a Diagnosis roll (+1 per TL over 9). The scanner works for 1 year on an A cell. Cr750, 0.5 pounds.

■ **Medscanner Computer (TL9):** A dedicated computer loaded with a medical expert system. The computer can read medscanner output and perform diagnoses even when operated by someone with no medical skill (actually implementing any indicated treatment is another matter). The expert system has Diagnosis skill at 11 (this can be improved by a successful use of the medscanner). Works for 1 year on an A cell. Cr20,000, 1 pound.

■ **Translator (TL10):** A small computer dedicated to the task of translating between two languages. The unit can be held in the hand or clipped to a belt or other clothing. The quality of translation is reasonable (effective skill 14 in the two languages), but there are drawbacks since the software is not intelligent. Even when working with similar languages, the unit may miss subtle nuances and will have trouble with highly idiomatic or metaphorical language. IISS policy is to prefer a more complex interpreter robot or a sentient interpreter over this device when possible.

For spoken languages, the translator has built-in speakers and can deliver translation to its user through an earpiece or headset. It has peripheral ports for connection to various standard accessories for generating unusual communications forms (color shifts, text symbols, ultra- or infrasound, and so on). These accessories vary widely in cost, and a complete set may cost as much as the basic translator unit itself. Translation requires that database chips for the two languages be inserted into the device. Language chips have negligible weight and cost Cr1,000 apiece (more for obscure or very difficult languages). The basic translator unit runs for a year on an A cell. Cr10,000, 1 pound.

Vehicles

The vast majority of the equipment used by the IISS is adapted directly from similar equipment in civilian use. IISS Rope, first aid kits, survival rations and so on, are identical

with their counterparts used elsewhere. Special-purpose scout vehicles and equipment do exist, however, and are dealt with in this chapter.

ROBOTS

The IISS uses a wide variety of robots to support its various missions – in fact, Scouts are more familiar and more comfortable with robots than most other Imperial citizens. The robots detailed in this section are the most sophisticated employed by the IISS, most commonly used by the Exploration and Survey Branches.

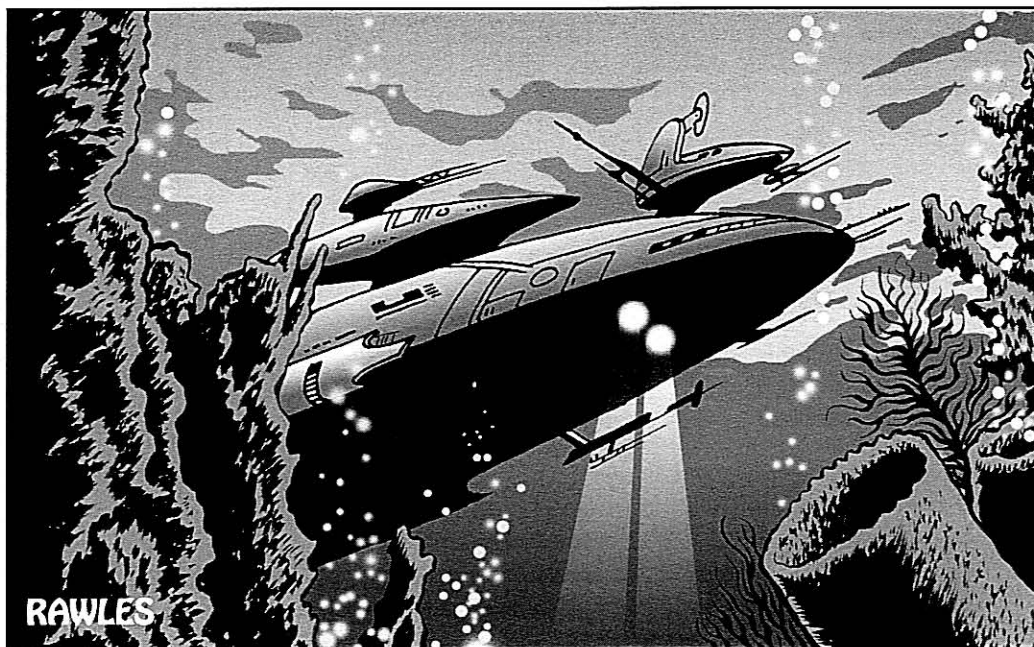
These robots were designed using the rules from *GURPS Robots*. The only modification is that the “model point costs” have been reduced by 10 points to reflect the Social Stigma all robots suffer in Imperial society (see p. 25).

BIOSURVEY ROVER (TL12)

This rover is intended for the study of local life-forms. It can track animal life, capturing small animals and using its integral weaponry to subdue larger ones for study in the field. Its internal rifle is usually loaded with tranq rounds, and it is capable of switching between round types to adapt to different biochemistries or necessary dosages. Replacing its tranq rounds with lethal ammunition, the rover can be deployed as a campsite guard. This is one of the most intelligent robots used by the IISS, not self-aware but able to learn new skills and adapt to new situations. The drawback is that it can be considered slightly dangerous, considering its in-built weaponry – the design skirts very close to Imperial prohibitions on “warbots.”

- **Brain:** Standard brain with compact, neural-net and +2 DX booster options (65 points, Complexity 7).
- **Sensors:** Basic sensor package with Acute Vision +3, Night Vision, Peripheral Vision, Thermograph, Acute Hearing +3 and Sonar (4 levels) options (97 points).
- **Communications:** Basic communicator package with No Cable Jack, Long-range Radio, and IFF options (12 points).
- **Arm Motors:** Two arm motors, each ST 20 (Power 0.2 KW).
- **Propulsion:** 0.4 KW motive power leg drivetrain, four leg motors (Power 0.4 KW).
- **Weaponry:** 9mm rifle with concealed mount, normally loaded with tranq rounds (15 points, Legality 4), Electroshocker with concealed mount (2 points, Legality 5).

- **Accessories:** Laser sight for rifle, flashlight, biosniffer, chemsniffer, medical tools, medscanner and inertial compass (5 points).
- **Power System:** Routine power requirement 0.6 KW. Rechargeable E-cell powers all systems, with endurance of 250 hours (28 points). Each shot from the electroshocker draws 27 KJ.
- **Subassemblies:** Head with full rotation, two arms, four legs.
- **Head Design:** Contains sensor package, communications package, flashlight, biosniffer, chemsniffer, and inertial compass. Component volume 0.122 cf, empty space 0.028 cf, total volume 0.15 cf.
- **Arm Design:** Right arm contains one arm motor, medical tools and medscanner. Component volume 0.065 cf, empty space 0.01 cf, total volume 0.075 cf. Left arm contains one arm motor and electroshocker. Component volume 0.07 cf, empty space 0.005 cf, total volume 0.075 cf.
- **Leg Design:** Each leg contains one leg motor. Component volume 0.03 cf, cargo space 0.09 cf (in front legs only), empty space 0.03 cf (front legs) or 0.12 cf (back legs), total volume 0.15 cf.
- **Body Design:** Contains brain, power cell, rifle, laser sight and rotation space for head. Component volume 0.8425 cf, cargo space 0.14 cf, empty space 0.0175 cf, total volume 1.0 cf.
- **Area:** Head 2 sf, Body 6 sf, Arms 1.5 sf each, Legs 2 sf each. Total surface area 19 sf.
- **Structure:** Heavy frame, expensive materials.
- **Hit Points:** Head 6, Body 18, Each arm 9, Each leg 6.
- **Armor:** PD 4, DR 40 laminate armor on all subassemblies (220 points, Legality 1).
- **Surface Features:** Basic chameleon system (15 points), radiation shielding (8 points). No biomorphic features.
- **Statistics:** Design weight 96.8 pounds. Usual payload 16 pounds. Loaded weight 112.8 pounds. Total volume 1.9 cf (1 hex, 3.5 feet long). Price Cr50,833. Body ST 28 (165 points), arm ST 20 (-27.5 points), DX 13 (30 points), IQ 11 (10 points), HT 12/18 (50 points). Ground speed 16, water speed 3 (30 points). Legality Rating 1. Model point cost: 714.5 points.



GEOSURVEY ROVER (TL12)

This simple robot is designed to perform geologic surveys of planetary surfaces. It is relatively unintelligent, incapable of learning beyond its programming or planning a response to a crisis. In a pinch, the rover can be reprogrammed to act as a mechanic's assistant.

- **Brain:** Small brain (-5 points, Complexity 6).
- **Sensors:** Basic sensor package with Microscopic Vision, No Sense of Smell/Taste, and Radscanner options (4 points).
- **Communications:** Basic communicator package with Mute, No Cable Jack, and Long-range Radio options (-8 points).
- **Arm Motors:** Two arm motors with ST 20 (Power 0.2 KW). Third arm motor with ST 20, striker and retractable options (Power 0.1 KW, 5 points).
- **Propulsion:** 0.2 KW motive power tracked drivetrain (Power 0.2 KW).
- **Accessories:** Flashlight, chemsniiffer, densitometer, seismic sensor, two sets of integral mechanical tools, inertial compass (5 points).
- **Power System:** Routine power requirement 0.5 KW. Rechargeable E-cell powers all systems, with endurance of 300 hours (28 points). Densitometer draws 18 KW power when in use.
- **Subassemblies:** Head with full rotation, two normal arms ("left" and "right"), one retractable striker arm ("center"), track set with four tracks.
- **Head Design:** Contains sensor package, communications package, densitometer and flashlight. Component volume 0.161 cf, empty space 0.039 cf, total volume 0.2 cf.
- **Arm Design:** Right and left arms each contain one normal arm motor and one set of mechanical tools. Component volume 0.22 cf, empty space 0.03 cf, total volume 0.25 cf. Center (striker) arm contains striker arm motor. Component volume 0.015 cf, empty space 0.005 cf, total volume 0.02 cf.

■ **Body Design:** Contains brain, drivetrain, chemsniiffer, seismic sensor, inertial compass, power cell, rotation space for head and retraction space for striker arm. Component volume 0.36 cf, cargo space 0.14 cf, no empty space, total volume 0.5 cf.

■ **Tracks Design:** Total volume 0.3 cf.

■ **Area:** Head 2.5 sf, Body 4 sf, Right and left arms 2.5 cf each, Center arm 0.5 cf, Tracks 3 sf. Total surface area 15 sf.

■ **Structure:** Heavy frame, standard materials.

■ **Hit Points:** Head 8, Body 12, Right and Left arms 15, Center arm 3, Each track 5.

■ **Armor:** PD 3, DR 12 metal armor on all subassemblies (111 points, Legality 3).

■ **Surface Features:** Sealed (20 points), radiation shielding (8 points). No biomorphic features.

■ **Statistics:** Design weight 90.3 pounds. Usual payload 7 pounds. Loaded weight 97.3 pounds. Total volume 1.5 cf (1 hex, 3.0 feet long). Price Cr20,155. Body ST 16 (70 points), arm ST 20 (32 points), DX 11 (10 points), IQ 9 (-10 points), HT 12 (20 points). Ground speed 38 (18 points), cannot float or swim. Legality Rating 3. Model point cost: 298 points.

PELAGIC ROVER (TL12)

The pelagic rover essentially functions as a biosurvey rover, able to swim or dive after oceanic life forms. It is also sometimes used in undersea geologic surveys. In both shape and behavior, it resembles a mechanical dolphin with tentacle arms: intelligent, adaptable, using a flexible body structure to swim. It is capable of awkward movement on land. Its high intelligence makes it very useful.

■ **Brain:** Standard brain with compact, neural-net and +1 DX booster options (65 points, Complexity 7).

■ **Sensors:** Basic sensor package with Color-Blindness, Infrasonic, Sonar (8 levels) and Radscanner options (60 points).

■ **Communications:** Basic communications package with Bullhorn, No Cable Jack and Long-range Radio options (12 points).

■ **Arm Motors:** Two arm motors, each ST 20 with extra-flexible and retractable options (Power 0.2 KW, 5 points).

■ **Propulsion:** 0.8 KW motive power flexibody drivetrain (Power 0.8 KW).

■ **Weaponry:** Electroshocker with concealed mount (10 points, Legality 5).

■ **Accessories:** Spotlight, medical tools, medscanner and inertial compass (5 points).

- **Power System:** Routine power requirement 1.0 KW. Rechargeable E-cell powers all systems, with endurance of 150 hours (25 points). Each shot from the electroshocker draws 27 KJ.
- **Subassemblies:** Two arms.
- **Arm Design:** Right arm contains one arm motor, medical tools and medscanner. Component volume 0.08 cf, empty space 0.02 cf, total volume 0.1 cf. Left arm contains one arm motor and electroshocker. Component volume 0.075 cf, empty space 0.025 cf, total volume 0.1 cf.
- **Body Design:** Contains brain, sensor package, communications package, drivetrain, spotlight, inertial compass, power cell and retraction space for arms. Component volume 0.9755 cf, empty space 0.2245 cf, total volume 1.2 cf.
- **Area:** Body 7 sf, Arms 1.5 sf each. Total surface area 10 sf.
- **Structure:** Light frame, expensive materials, flexible option (15 points).
- **Hit Points:** Body 5, Each arm 2.
- **Armor:** PD 2, DR 16 nonrigid armor on all subassemblies (93 points, Legality 4).
- **Surface Features:** Sealed (20 points). No biomorphic features.
- **Statistics:** Design weight 64.9 pounds. Total volume 1.2 cf (1 hex, 3.2 feet long). Price Cr50,103. Body ST 10 (0 points), arm ST 20 (55 points), DX 12 (20 points), IQ 11 (10 points), HT 12/5 (-15 points). Ground speed 9.5, water speed 10 (10 points). Legality Rating 4. Model point cost: 380 points.

STEALTH SURVEILLANCE DRONE (TL12)

This is the most common orbit-to-ground drone used by IISS exploration vessels. Difficult to spot with the naked eye, well-concealed by stealth technology, it is most often used when studying low-technology cultures secretly. The drone is piloted down into an inhabited area, either remotely or using on-board computer control. Once near the surface it can be posted in a concealed location, where it will use its superb

visual and aural sensors to eavesdrop on the speech and actions of local inhabitants. Surveillance drones are also sometimes used in support of Security Branch covert operations.

- **Brain:** Small brain with compact and +2 DX booster options (-5 points, Complexity 6).
- **Sensors:** Basic sensor package with Acute Vision +3, Night Vision, Peripheral Vision, Telescopic Zoom (4 levels), Thermograph, Super-Hearing, No Sense of Smell/Taste and Search Radar options (115 points).
- **Communications:** Basic communications package with Mute, No Cable Jack and Long-range Radio options (-8 points).
- **Arm Motors:** None. No arms or legs (-50 points).
- **Propulsion:** Reactionless thruster with 30 pounds thrust, vectored-thrust configuration (Power 1.5 KW).
- **Accessories:** Flashlight, self-destruct device with 1 pound of explosive, inertial compass (5 points).
- **Power System:** Routine power requirement 1.5 KW. Rechargeable D-cell powers all systems, with endurance of 10 hours (0 points).
- **Subassemblies:** None.
- **Body Design:** Contains all components. Component volume 0.267 cf, empty space 0.008 cf, total volume 0.275 cf.
- **Area:** Total surface area 3 sf.
- **Structure:** Medium frame, expensive materials.
- **Hit Points:** Body 5.
- **Armor:** PD 4, DR 20 laminate armor (160 points, Legality 2).
- **Surface Features:** Sealed (20 points), radiation shielding (8 points), instant chameleon system (30 points), stealth and IR cloaking (12 points). No biomorphic features.
- **Statistics:** Design weight 20.5 pounds. Total volume 0.275 cf (1 hex, 2.0 feet long). Price Cr7,520. Body ST 10 (0 points), DX 13 (30 points), IQ 9 (-10 points), HT 12/5 (-15 points). No ground movement, cannot float or swim (-5 points). Can hover (40 points). Air speed 77 (40 points). Legality Rating 2. Model point cost: 352 points.



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SCOUT EXPEDITION DRESS (TL12)

The IISS uses specialized battle armor in a variety of situations. Scout battlesuits tend to be more lightly armored than those used by the military services, relying on air-mobility, improved sensor suites, and stealth to avoid damage. This particular example is used by S-3 squads in the field. Exploration Branch scouts also find it useful for excursions into very hostile environments, although it requires a rather specialized set of skills to use properly.

- **Subassemblies:** Head (limited-rotation turret), two arms, two legs.
- **Body Features:** Fair streamlining.
- **Propulsion:** Leg drivetrain with 6 KW motive power (Legs, 6 HP each, Power 6 KW). Reactionless thrusters (TL11) with 100 pounds total thrust (Legs, 4 HP each, 5 KW).
- **Aerostatic Lift:** Contragrav unit rated for 800 pounds (Body, 3 HP, 0.8 KW).
- **Instruments and Electronics:** Short-range meson communicator (Left leg, 4 HP, Power 0.1 KW, 2,000 miles), medium-range laser communicator (Head, 1 HP, Power 0.1 KW, 10,000 miles), long-range radio communicator (Right leg, 1 HP, Power 0.04 KW, 50,000 miles), 10-mile



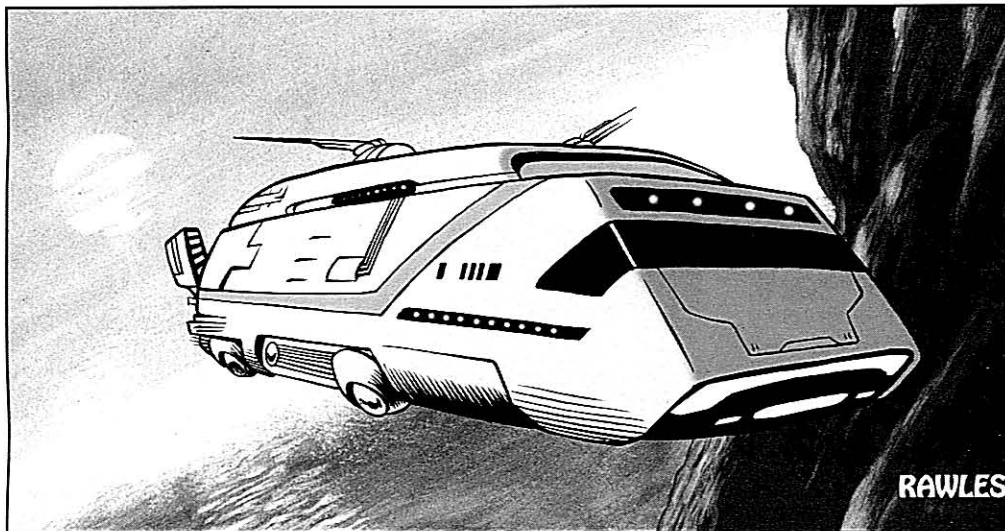
AESA with air-search option (Body, 2 HP, Power 2.5 KW, Scan +17), 20-mile PESA (Head, 3 HP, Scan +19), 4-mile radscanner (Left arm, 1 HP, Scan +15), 1-mile gravscanner (Right leg, 3 HP, Scan +11), 1-mile geophone (Right leg, 3 HP, Scan +11), Biosniffer (Right arm, 1 HP), Chemsniffer (Right arm, 1 HP), Level 10 surveillance sound detector (Head, 1 HP), HUDWAC, Deceptive jammer (Body, 3 HP, Power 1 KW, rating 4), Standard radar/laser detector (Body, 2 HP), Small computer (Body, 1 HP, Complexity 6).

- **Miscellaneous Components:** Arm motors with ST 30 (Arms, 1 HP each, Power 0.3 KW).
- **Controls:** Computer.
- **Crewstations:** Pilot. Battledress crew station rated for 180-pound pilot.
- **Occupancy:** Short.
- **Accommodations:** Battledress crew station.
- **Environmental Systems:** NBC kit (Body, 2 HP, Power 0.25 KW), Full lifesystem (Body, 6 HP, Power 0.1 KW).
- **Power:** 540 MJ rechargeable power cell (Right leg, HP 2, E-cell, 9 hours, 15 minutes).
- **Empty Space:** Head 0 cf, Body 0.128 cf, Left arm 0.02 cf, Right arm 0.04 cf, Left leg 0.155 cf, Right leg 0.13 cf.
- **Volume:** Head 0.75 cf, Body 4 cf, Arms 0.25 cf each, Legs 1.8 cf each.
- **Surface Area:** Head 5 sf, Body 16 sf, Arms 2.5 sf each, Legs 9 sf each. Total surface area 44 sf.
- **Structure:** Medium advanced.
- **Hit Points:** Head 8 HP, Body 24 HP, Arms 8 HP each, legs 15 HP each.
- **Armor:** Head and body PD 4, DR 60 advanced laminate. Arms and legs PD 4, DR 40 advanced laminate.
- **Surface Features:** Sealed, thermal superconductive armor, instant chameleon system, basic emission cloaking, basic stealth, basic sound baffling, radiation shielding, improved suspension.
- **Statistics:** Design weight 410.35 pounds, usual payload 180 pounds, loaded weight 590.35 pounds (0.3 tons). Volume 8.85 cf, Overall size modifier +0, Height 8.2 feet. Size modifiers Head -2, Body +0, Arms -3, Legs -1.
- **Price:** KCr163.
- **Health:** HT 12.
- **Ground Performance:** Top speed 40 mph, gAccel 15 mph/s, gDecel 20 mph/s, gMR 3, gSR 2, Very low ground pressure, full off-road speed.
- **Water Performance:** Can float. Hydrodynamic drag 15, aquatic motive thrust 112 pounds, top speed 12 mph, wAccel 180 mph/s, wDecel 125 mph/s, wMR 1.25, wSR 5, draft 0.6 feet.
- **Submerged Performance:** Can submerge. Submerged hydrodynamic drag 70, top speed 7 mph, uAccel 4 mph/s, crush depth 250 yards.
- **Aerial Performance:** Can fly and hover. Aerial motive thrust 100 pounds, aerodynamic drag 22, top speed 185 mph, aAccel 3 mph/s, aMR 6.5, aSR 3, aDecel 26 mph/s.
- **Space Performance:** sAccel 0.17 G.

LONG-RANGE PROBE (TL12)

This is essentially a robot rather than a vehicle, but was designed using the *GURPS Vehicles* rules since it is normally used once and then discarded. It is based on the SIM-12 missile (see p. GT159) with the warhead ripped out and an improved sensor suite added. A modular socket is present to carry custom-built scientific packages.

- **Subassemblies:** None.
- **Body Features:** Very good streamlining.
- **Propulsion:** Reactionless thruster (TL11) with 3,000 pounds thrust and vectored-thrust option (9 HP, Power 150 KW).
- **Instruments and Electronics:** Long-range laser communicator (HP 6, Power 0.4 KW), PESA with 20-mile range (HP 2), Inertial navigation system (HP 2), Minicomputer with hardened option (5 HP, Complexity 7).
- **Miscellaneous:** Modular socket with 1.3 cf capacity.



- **Energy Bank:** Rechargeable E-cell holds 540 MJ at full capacity, enough power for about one hour of operation.
- **Volume:** Body 6 cf.
- **Surface Area:** Body 20 sf.
- **Structure:** Medium frame, standard materials, robotic option, very good streamlining.
- **Hit Points:** Body 30.
- **Armor:** PD 4, DR 120 advanced metal.
- **Surface Features:** Sealed, radiation shielding.
- **Statistics:** Empty weight 270 pounds. Usual payload 26 pounds. Loaded weight 296 pounds (0.15 tons). Volume 6 cf. Size modifier +0. Price Cr90,275. Structural HT 12.
- **Water Performance:** Can float. Hydrodynamic drag 44. Aquatic motive thrust 3,000 pounds. Top speed 25 mph. wAccel 200 mph/s. wMR 1. wSR 4. wDecel 10 mph/s (110 mph/s). Draft 0.4 feet.
- **Aerial Performance:** Can fly and hover. Aerial motive thrust 2,704 pounds. Aerodynamic drag 4. Top speed 740 mph. aAccel 183 mph/s. aMR 6. aSR 2. aDecel 24 mph/s.
- **Space Performance:** sAccel 10 G.

MOBILE EXPLORATION BASE (TL12)

This TL12 grav-carrier is designed for the special needs of the IISS. It has an extensive sensor array and integrated science-lab facility. Several versions are produced for different scientific specialties. Major expeditions carry as many as a dozen MEB for long-term study of a planet's geology and ecology.

- **Subassemblies:** Retractable skids (three skids).
- **Body Features:** Very Good streamlining.
- **Propulsion:** Reactionless thruster (TL11) with 40,000 pounds thrust and vectored-thrust option (HP 100, Power 2 MW).
- **Aerostatic Lift:** Four contragrav units rated for 20,000 pounds each (each 4 HP, Power 10 KW).
- **Instruments and Electronics:** Long-range radio (HP 1, Power 0.04 KW, Range 50,000 miles), Two medium-range radios (each HP 1, Power 0.01 KW, Range 5,000 miles), PESA with 10-mile range (HP 3), Radar with 20-mile range and AESA and no-targeting options (HP 2, Power 10 KW), Terrain-following radar (HP 1, Power 0.25 KW), Densitometer (HP 1, 18 KW), Geophone with 2-mile range (HP 3), Radscanner with 4-mile range (HP 1), Chem-sniffer (HP 1), Neural activity sensor (HP 3), Sound detector with 6 levels of amplification (HP 1), Inertial navigation system (HP 2), Microframe computer (HP 6, Power 0.1 KW, Complexity 8), Six terminals (each HP 12).

- **Miscellaneous:** Full fire-suppression system (HP 15), Four-man airlock (HP 250), Science lab (HP 600, Power 3 KW).
- **Controls:** Computerized. Crew stations: Roomy. "Driver" operates maneuver controls, "Sensor officer" operates sensors and communications. Four extra crew stations for redundancy or scientific work.
- **Accommodations:** Long-term occupancy, room for six passengers or off-shift crew. Six roomy crew stations (each HP 70), Six bunks (each HP 129), Total lifesystem for twelve people (HP 79, Power 1.2 KW), Six crashwebs (each HP 1).
- **Power Systems:** Nuclear power plant with 2.2 MW output (HP 17, endurance 10 years). Powers all systems, with about 50 KW excess power for battery recharge or upgrades.
- **Energy Bank:** 27 MJ rechargeable power bank dedicated to the life-support system (HP 1), will run life-support for about 6.25 hours.
- **Access, Cargo and Empty Space:** 132.2 cf access space. 300 cf cargo space. 5.74 cf empty space.
- **Volume:** Body 3,500 cf, Skids 175 cf.

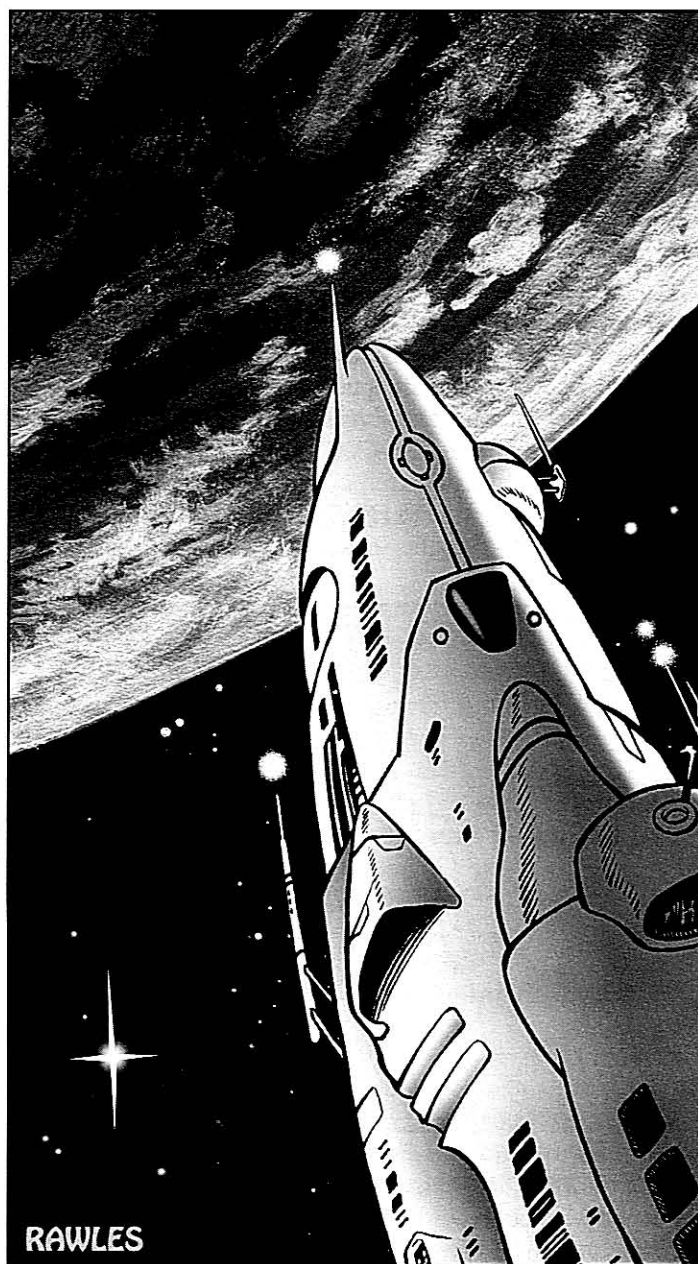
- **Surface Area:** Body 1,383 sf, Skids 188 sf. Total surface area 1,571 sf.
- **Structure:** Heavy frame, expensive materials.
- **Hit Points:** Body 4,149, Skids 175 each.
- **Armor:** PD 4, DR 100 expensive laminate on body, PD 4, DR 40 expensive laminate on skids.
- **Surface Features:** Sealed, radiation shielding.
- **Vision:** Good.
- **Statistics:** Empty weight 35,034 pounds. Usual payload 8,400 pounds. Loaded weight 43,434 pounds (21.72 tons). Volume 3,500 cf (with skids retracted). Size Modifier +6. Price MCr2.082. Structural HT 12.
- **Air Performance:** Can fly and hover. Aerial motive thrust 40,000 pounds, aerodynamic drag 277, top speed 740 mph, aAccel 18 mph/sec, aMR 3.5, aSR 5, aDecel 14 mph/s.
- **Space Performance:** sAccel 0.92 G.

PELAGIC SURVEY VESSEL (TL12)

This is a multi-purpose ocean vessel, capable of operating both on the surface and submerged. It is most often used as a platform for the study of ocean life or undersea geology. It can also be used as an infiltration platform for Scout teams on land. It can be carried in a standard modular cutter for delivery to a planetary surface.

Oddly enough, the PSV is a workable space vessel, although it should be used as such only in dire emergency (it's unable to re-enter atmosphere and isn't designed to dock with true spacecraft).

- **Subassemblies:** Superstructure.
- **Body Features:** Flotation hull, submersible, submarine lines.
- **Propulsion:** Reactionless thruster (TL11) with 72,000 pounds thrust (HP 104, Power 3.6 MW).
- **Instruments and Electronics:** Long-range radio (Su, HP 1, Power 0.04 KW, Range 50,000 miles), Two medium-range radios (Su, each HP 1, Power 0.01 KW, Range 5,000 miles), Searchlight (Su, HP 3, Power 1 KW), Searchlight (Bo, HP 3, Power 1 KW), Low-light TV (HP 1), PESA with 2-mile range (Su, HP 1), Radar with 2-mile range and AESA and air-search options (Su, HP 1, Power 0.25 KW), Passive sonar with 20-mile range and towed-array option (HP 20), Active sonar with 10-mile range (HP 15, Power 25 KW), Radscanner with 10-mile range (HP 1), Neural activity sensor (HP 3), Inertial navigation system (HP 2), Microframe computer (HP 6, Power 0.1 KW, Complexity 8), Four terminals (each HP 12).
- **Miscellaneous:** Full fire-suppression system (HP 15), Two-man airlock (Su, HP 129), Dry-dock for four pelagic rover robots (HP 27), Science lab for Xenobiology skill (HP 600, Power 3 KW).
- **Controls:** Computerized maneuver and diving controls. Crew stations: Cramped. "Helmsman" operates maneuver controls, "Diving officer" operates diving controls, "Sensor officer" operates sensors and communications.
- **Accommodations:** Long-term occupancy, room for five



passengers or off-shift crew. Three cramped crew stations (each HP 44), Five bunks (each HP 129), Total lifesystem for eight people (HP 60, Power 0.8 KW).

- **Power Systems:** Nuclear power unit with 3.7 MW output (HP 23, endurance 10 years). Powers all systems with about 69 KW excess power for battery recharge or upgrades.
- **Energy Bank:** 27 MJ rechargeable power bank dedicated to the life-support system (HP 1), will run life-support for about 9.4 hours. Excess power from the main plant can fully recharge the life-support bank in about 6.5 minutes.
- **Access, Cargo and Empty Space:** 158.98 cf access space. 350 cf cargo space (Su 10 cf, Bo 340 cf). 6.8625 cf empty space (Su 0.1125 cf, Bo 6.75 cf).
- **Volume:** Superstructure 120 cf, Body 3,380 cf.
- **Surface Area:** Superstructure 146 sf, Body 1,351 sf. Total surface area 1,589 sf.
- **Structure:** Extra-heavy frame, standard materials,

submersible option. Heavy compartmentalization in body. Roll stabilizers.

- **Hit Points:** Superstructure 876, Body 8,106.
- **Armor:** PD 4, DR 200 standard laminate.
- **Surface Features:** Basic chameleon system, basic sound baffling, electrified surface.
- **Vision:** No view. Vision is only available from the conning platform on the superstructure (if on surface) or via sensors.
- **Statistics:** Empty weight 47,201 pounds. Usual payload 8,879 pounds. Loaded weight 56,080 pounds (28.04 tons).

Volume 3,500 cf. Submerged weight 218,750 pounds (109.38 tons). Size modifier +6. Price MCr2.416. Structural HT 12.

- **Water Performance:** Can float. Hydrodynamic drag 293. Aquatic motive thrust 72,000 pounds. Top speed 40 mph. wAccel 25 mph/s. wMR 0.75. wSR 6. wDecel 15 mph/s (27.5 mph/s). Draft 5.1 feet.
- **Submerged Performance:** Can submerge. Submerged hydrodynamic drag 363. Top speed 35 mph. uAccel 5 mph/s. Submerged draft 20 feet. Crush depth 8,400 yards.
- **Space Performance:** sAccel 1.3 G.

STARSHIPS

The Scout Fleet consists of an eclectic variety of highly specialized ships. These range from the *Suleiman*-class scout/courier and express boat, all the way up to *Ashanti High Lightning*-class frontier cruisers and *Kokirrak*-class dreadnaughts acquired as surplus from the Imperial Navy. This section covers some of the ships most likely to be encountered in IISS service.

NEW MODULES

Scout Service ships have a number of special systems not often seen on merchant vessels or warships. In particular, the following types are referred to in the starship descriptions later in this chapter. The modules are described at TL12, but TL10 equivalents are given.

Communications Module: This module contains a single massive laser communicator, with 10 million miles transmission range (and 100 times that in reception). There are three hardened, high-capacity mainframe computers, 50 terabytes of hardened data storage with double backups, and an energy bank with enough capacity for five hours of full operation. The module is designed for high redundancy, with the three computers all checking each other's results and the three sets of data stored in different locations. The laser communicator is used for its very high bandwidth. Even with the usual high level of encryption and error-correction on the signal, the module can upload or download its entire storage capacity in about an hour. The module takes up 12 spaces. Mass: 138.1 tons. Cost: MCr3.830. Crew requirement: 0-1. The equivalent TL10 module has the same size and cost, but carries only 500 gigabytes of data.

Logistics Module: Starships intended for long-range operation need to be self-sufficient, able to manufacture their own spare parts from found materials. The logistics module contains two "complete" workshops, with all the tools needed for the Armoury, Electronics, Engineering, and Mechanic skills at the module's TL. Up to 6 people can work in the module at the same time. The module takes up 5 spaces. Mass: 30.0 tons. Cost: MCr0.12. Crew requirement: 0 (ship's engineers and support crew use the module on an occasional basis). The equivalent TL10 module has the same size and cost.

Probe Module: This module is designed for the launch and control of long-range probes (see p. 33). An IISS long-

range probe is essentially a standard 0.15-ton missile, with the warhead replaced by some kind of instrument package. A probe module consists of three launch systems, each including a breech-loading launch tube, a very-long-range laser communicator, a computer terminal and a roomy crew station for probe control. There is storage space for 20 probes and 40 modular instrument packages. Depending on the exact load, a full complement of probes and modules would mass about 3 tons and cost about MCr2. The module takes up 1 space in the ship. Mass: 1.2 tons (empty). Cost: MCr0.033 (empty). Crew requirement: 0-3. The equivalent TL10 module has the same size and cost, although different probes may be used.



Survey Module: A survey module contains four sets of astronomical instruments, four high-resolution planetary survey arrays, a mainframe computer, eight roomy crew stations with computer terminals, and a "survey center" with sophisticated holographic-projection devices (built as a 100-sf "holoventure zone"). This allows the survey specialists to create visualizations of incoming data. Use of the survey module is detailed in Chapter 7. The module takes up 4 spaces in the ship. Mass: 5.4 tons. Cost: MCr7.63. Crew requirement: 4-8. The equivalent TL10 module masses 7.4 tons and costs MCr12.66.

100-TON EXPRESS BOAT (TL12)

The Imperial standard express boat is found in every system along the Xboat links. It is the most optimized ship design in Imperial service, well-fitted to its intended purpose but almost useless for any other application. It has a jump drive, but no maneuver drive. The express boat is dependent on its tender for fuel, maintenance and movement through normal space.

The ship's primary function is to carry extensive data storage banks and communications gear. The standard Xboat design can carry 150 *terabytes* of data, transmitting or receiving the entire load in just over an hour. In practice, the Xboat rarely runs at full capacity except in portions of the network which connect a number of high-population, high-technology worlds.

The ship has two staterooms, one for the pilot and one for a possible passenger. There is a small cargo hold for critical shipments. The ship's locker holds the pilot's vacc suit, a rescue ball, and the ship's only armament (a shotgun or sub-machine gun for repelling boarders).

Express boats do not officially have names. Each has an identifying number. When pilots and ships stay together for long periods, as sometimes happens in frontier areas, the pilot may have an unofficial name for his boat.

The IISS has occasionally experimented with variant designs, incorporating low-power maneuver drives or solar sails. None of these have seen full-scale production. Currently the Communications Office is experimenting with a jump-6 express boat of radically different design, but the technology is expensive and unreliable. Fast express boats may occasionally be found on some of the network's "backbone" routes, such as from Core to Terra or Vland, but there are no plans to implement a jump-6 network in the foreseeable future.

Crew: Pilot (Astrogation, Electronics Operation [Communications], Engineering, and Mechanic).

100-ton USL Hull, DR 100, Basic Bridge, 3 Communications, Engineering, 5 Jump, 40 Fuel, 2 Staterooms, Utility, 6.5 Cargo.

Statistics: EMass 537.9, LMass 570.4, Cost: MCr37,414, HP 15,000. Hull Size Modifier: +8.

Performance: Jump 4.

400-TON DONOSEV-CLASS SURVEY SCOUT

The *Donosev*-class is the workhorse of the Imperial Grand Survey. Its task is to continually re-survey star systems and worlds within Imperial space, updating maps and maintaining navigational beacons.

The heart of the ship is the survey module, which is usually manned by four survey specialists. The spacedock normally carries three air/rafts, a 50-ton modular cutter with lab module and a spare fuel-skimming module. Survey operations are carried out using a combination of on-board sensors, long-range probes, and cutter overflights. The ship is primarily designed to work from orbit, but some lab space is set aside to handle geological or biological samples. The survey scout is almost never armed, although in dangerous regions the ship can easily mount four turrets at the cost of four tons of cargo space.

Survey scouts are named after past senior members of the IISS Exploration and Survey Offices.

Crew: Pilot (Pilot [Spacecraft]), Navigator (Astrogation), Sensor Officer (Electronics Operation [Sensors]), Communications Officer (Electronics Operation [Communications]), Engineer (Engineering and Mechanic), Small Craft Pilot (Pilot [Small Craft]), and 4 survey specialists (Cartography and Electronics Operation [Sensors]).

400-ton USL Hull, DR 100, Basic Bridge, Engineering, 15 Maneuver, 16 Jump, 120 Fuel, 162 Spacedock, 10 Staterooms, 4 Lab, Probe, Survey, Utility, 2 Fuel Processor, 27.5 Cargo.

Statistics: EMass 412.3, LMass 728.7, Cost: MCr139.64, HP 37,500. Hull Size Modifier: +9.

Performance: Accel 2.1 Gs, Jump 3.

400-TON KHADUMIR-CLASS FAST COURIER

Whenever messages or small cargoes must travel faster than an Xboat could carry them, or across routes not served by the Xboat network, the IISS uses the fast courier. Its jump-6 capability allows it to cross subsector distances in a relatively short time, and it is capable of wilderness refueling so as to cross space away from the main trade routes.

The fast courier carries much less data than an Xboat, but more than enough for high-priority Imperial traffic. It has a small cargo hold, and enough staterooms to carry several passengers if the crew use double occupancy. Fast couriers are generally armed well enough to defend against corsairs, although they cannot survive a sustained battle.

Fast couriers are named after famous messengers from history or myth. A nearly identical ship class is in Imperial Navy service as a fleet courier, and many private organizations have experimented with similar designs.

Crew: Pilot (Pilot [Spacecraft]), Navigator (Astrogation), Sensor Officer (Electronics Operation [Sensors]), Communications Officer (Electronics Operation [Communications]), Engineer (Engineering and Mechanic). Up to four gunners may be added to the crew as needed.

400-ton SL Hull, DR 200, 4 turrets (2 triple lasers, 2 triple missile racks), Command Bridge, Engineering, 12 Maneuver, 28 Jump, 240 Fuel, 5 Staterooms, Utility, 5 Fuel Processor, 2.5 Cargo.

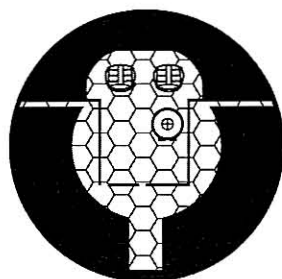
Statistics: EMass 780.2, LMass 869.5, Cost: MCr157.087, HP 39,900. Hull Size Modifier: +9.

Performance: Accel 1.4 Gs, Jump 6.

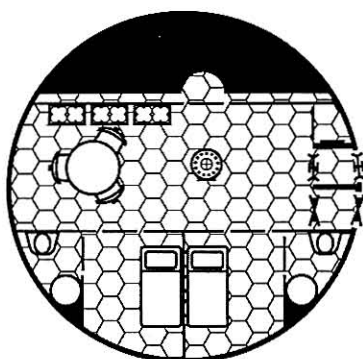
IMPERIAL INTERSTELLAR SCOUT SERVICE

100-TON EXPRESS BOAT

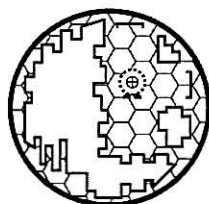
DECK 1



DECK 2



DECK 3

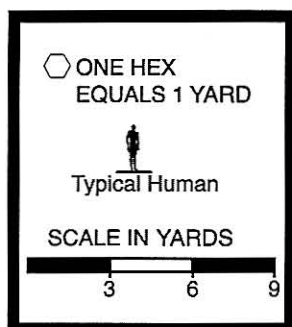
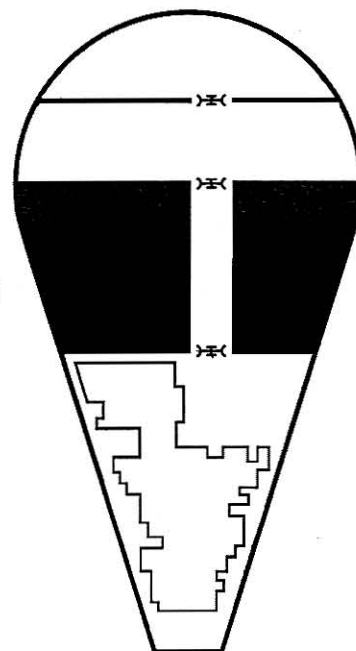


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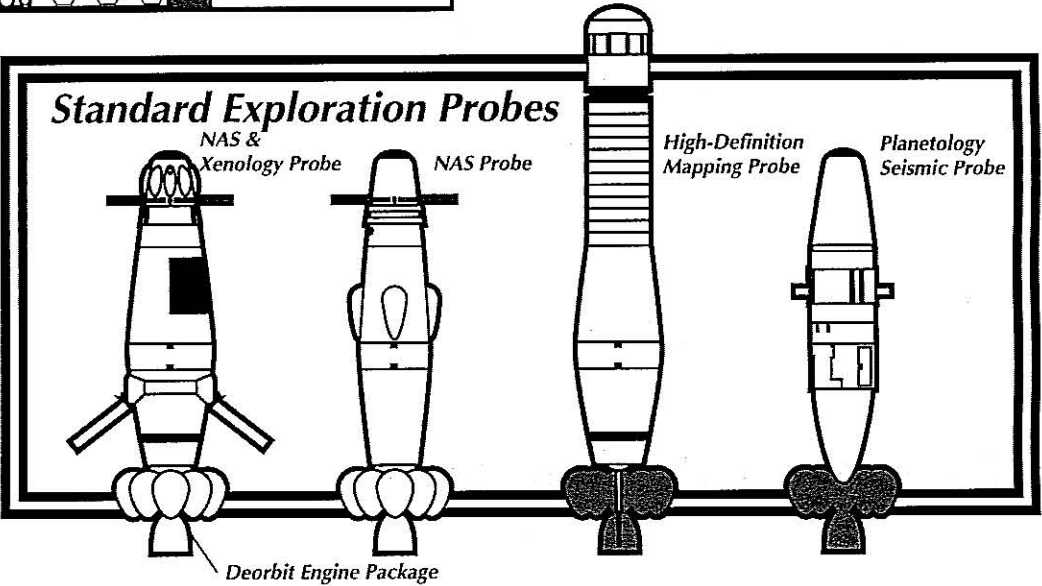
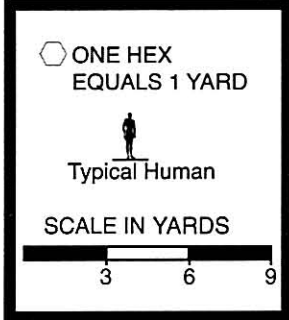
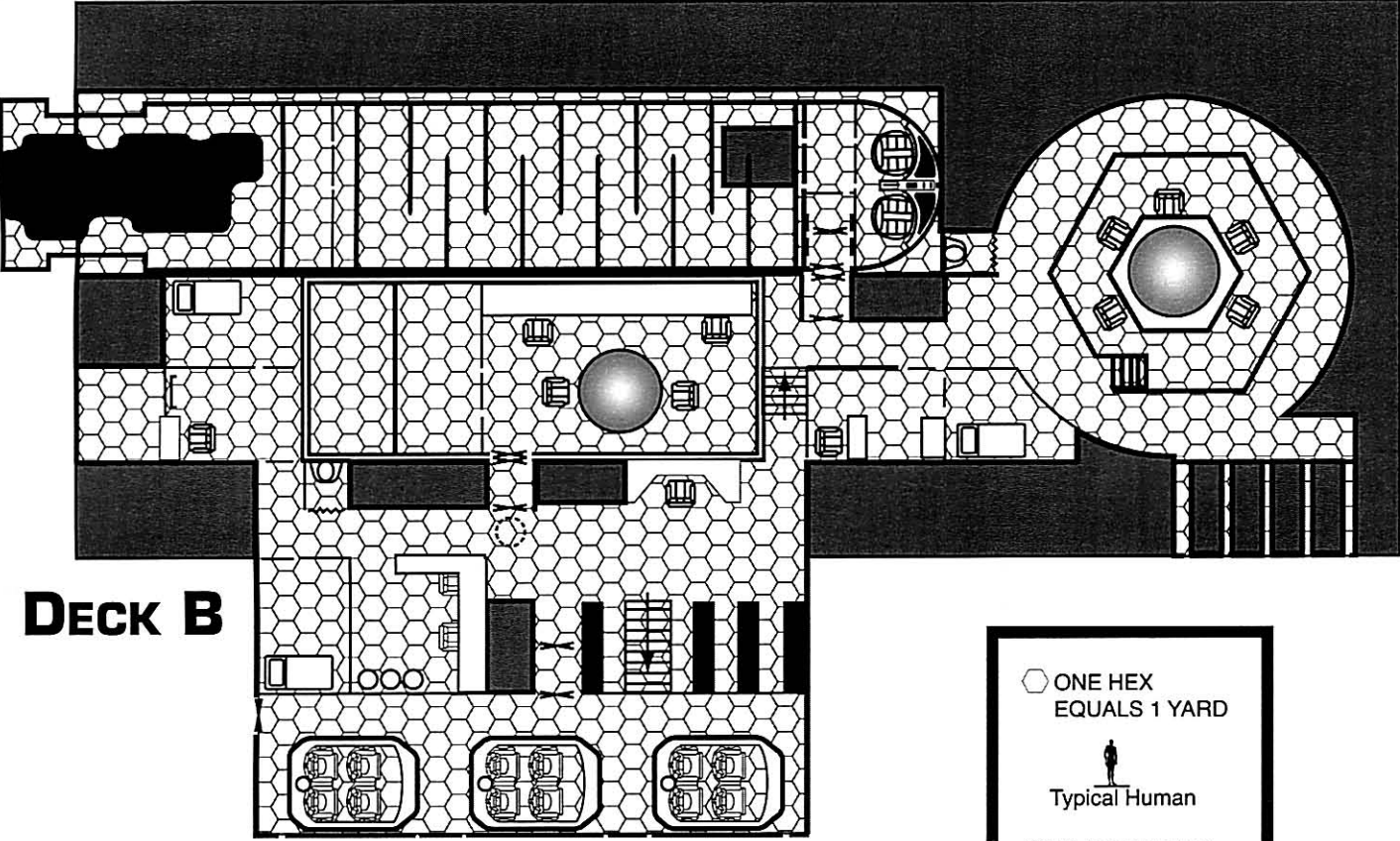
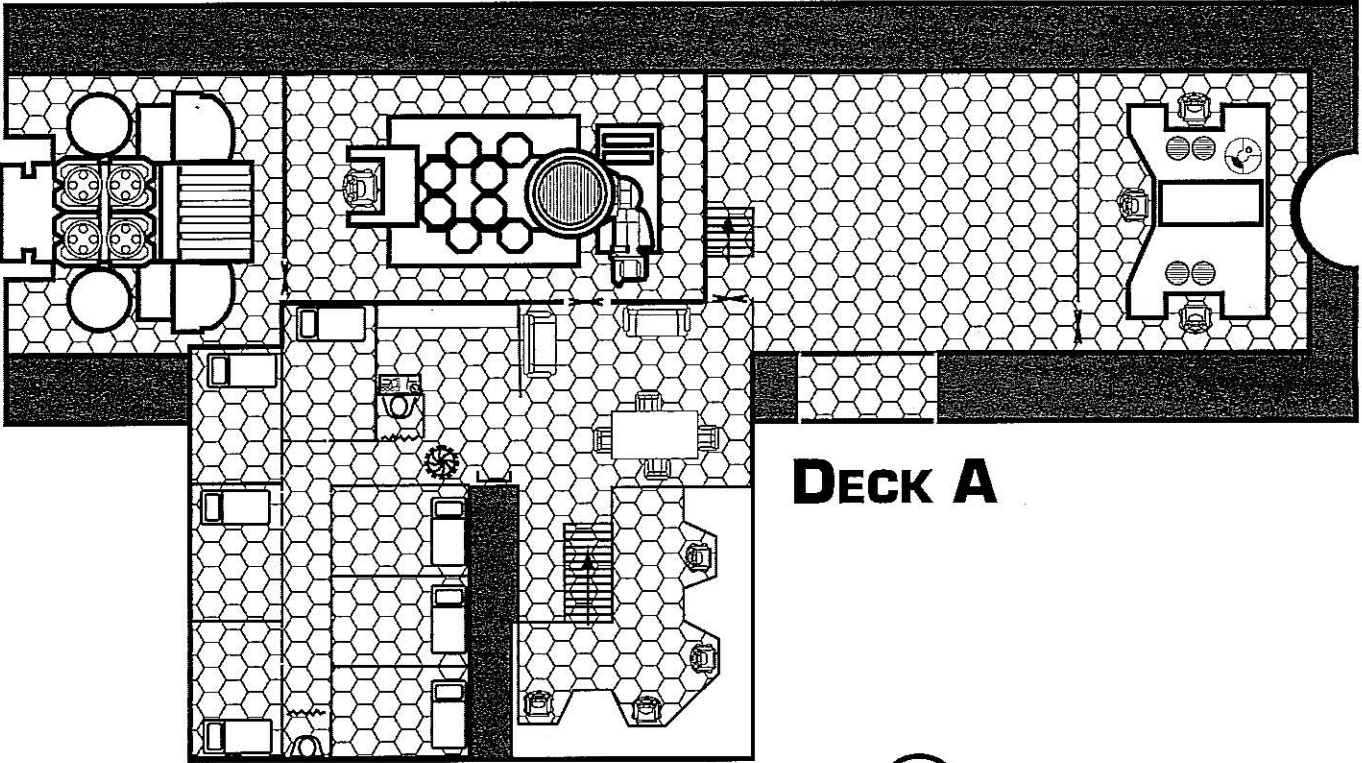
**FUEL
TANKAGE**

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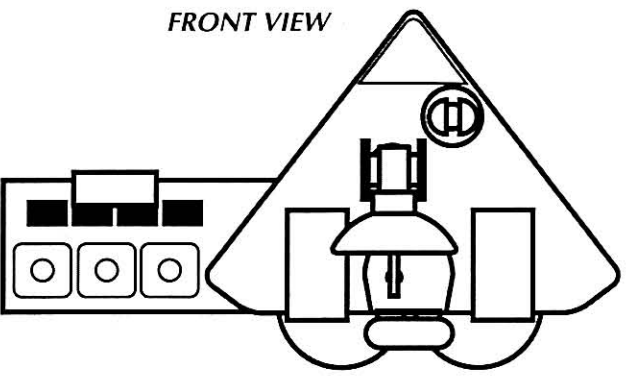
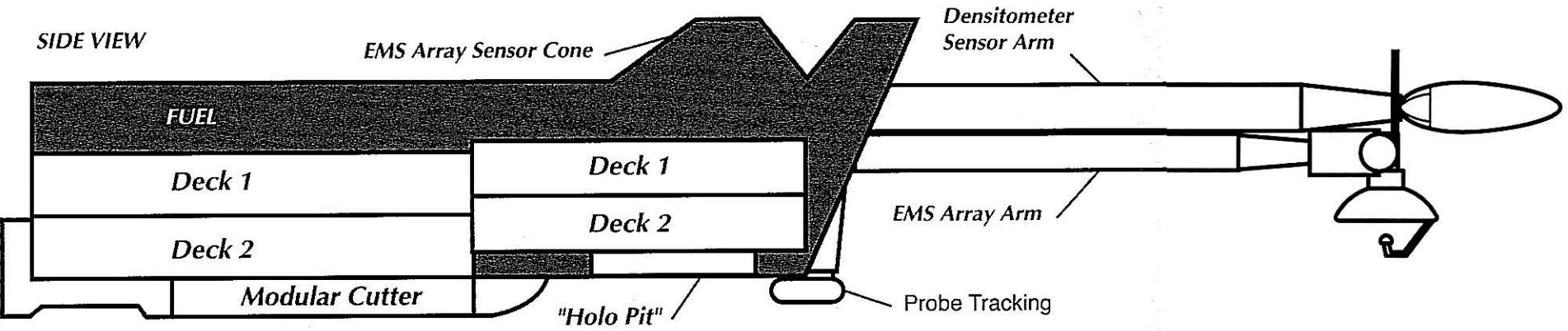


Deck Plan Symbols	
	Cargo Elevator
	Sliding Door
	Folding Airtight Partition
	Interior Partition
	Airtight Bulkhead
	Access Panel
	Iris Valve
	Iris Valve, Overhead
	Iris Valve, Floor
	Iris Valve, Floor and Overhead
	Acceleration Couch
	Fresher

DONOSEV-CLASS SCOUT SURVEY SHIP



Deck Plan Symbols					
— — —	Sliding Door		Iris Valve, Floor and Overhead		Iris Valve
— — —	Interior Partition		Acceleration Couch		Iris Valve, Overhead
— — —	Airtight Bulkhead		Fresher		Iris Valve, Floor
— — —	Access Panel				



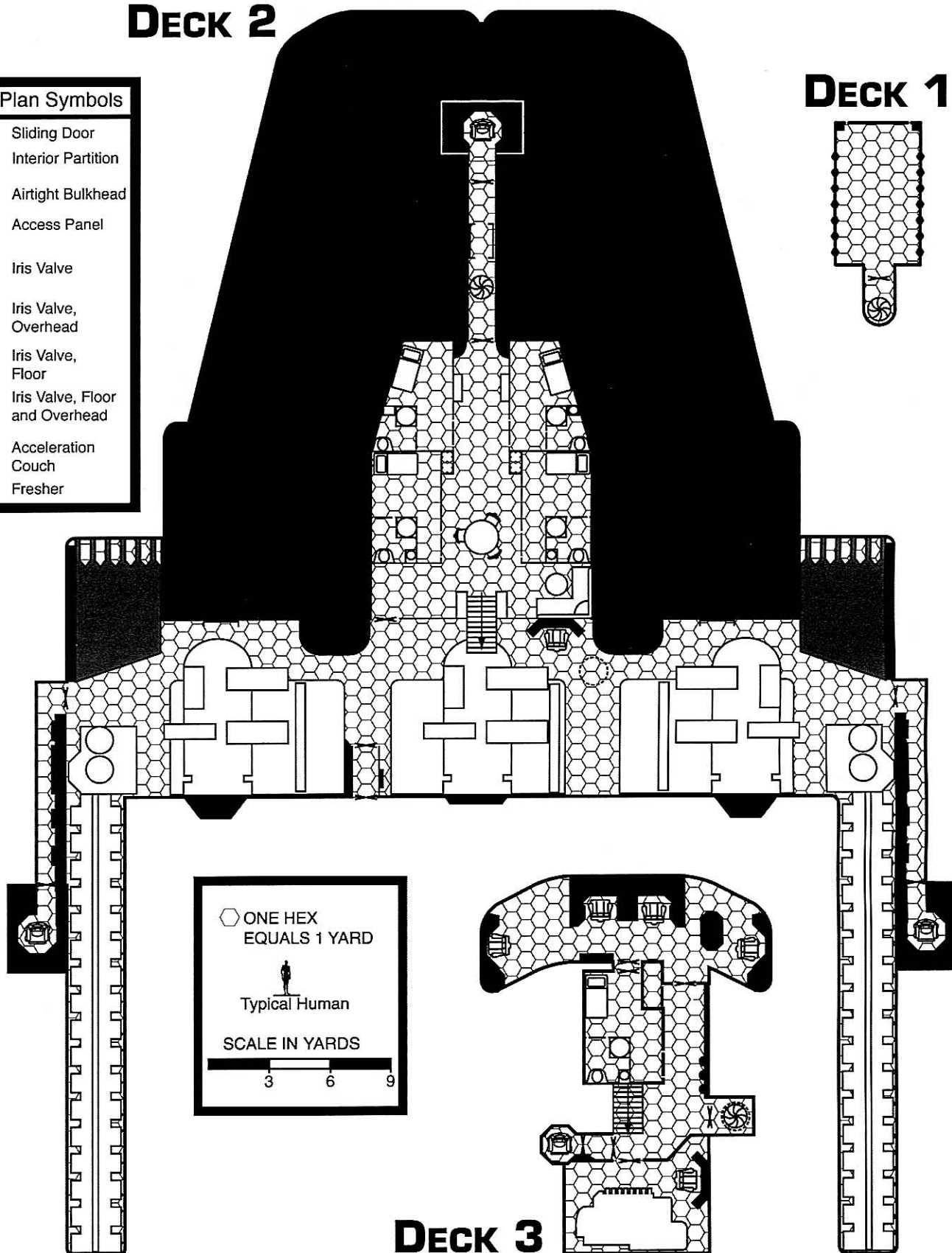
400-TON *KHADUMIR*-CLASS FAST COURIER

DECK 2

DECK 1

Deck Plan Symbols

	Sliding Door
	Interior Partition
	Airtight Bulkhead
	Access Panel
	Iris Valve
	Iris Valve, Overhead
	Iris Valve, Floor
	Iris Valve, Floor and Overhead
	Acceleration Couch
	Fresher



DECK 3

1,000-TON *PURCELL*-CLASS EXPRESS BOAT TENDER

The Xboat tender provides maintenance and support for express boats on the Imperium's major communications routes. Once an express boat has entered a system and transmitted its load of message data, the tender moves to pick up the boat. The tender crew services the boat, replenishes its energy banks and stores, and (sometimes) replaces the pilot before sending the boat out for the next system along the route.

Any system on the express boat routes will have at least one tender present at all times. Important systems may have several in operation at the same time. The tenders are jump capable and can be found in off-route systems, ferrying extra Xboats where they are needed. They also undertake recovery missions when express boats are damaged or misjump off their normal routes.

The tender carries three turrets, although under most circumstances these are left empty. There is no standard weapon load; a tender is armed, when necessary, with any available weapons. Two of the turrets are on long tracks. This makes them able to cover any arc of fire, but the unusual arrangement causes weapon stabilization to suffer (-2 to Gunnery skill).

This class of tenders is named after past senior members of the IISS Communications Office.

Crew: Captain (Leadership and Tactics), Pilot/Navigator (Astrogation and Pilot [Spacecraft]), Sensor Officer (Electronics Operation [Sensors]), Communications Officer (Electronics Operation [Communications]), and two Engineers (Engineering and Mechanic). Up to three gunners may be added to the crew as needed. Express boat pilots awaiting assignment usually fill in any empty crew slots. There are usually about four Xboat pilots on station at any given time.

1,000-ton USL Hull, DR 100, 3 turrets, Command Bridge, Engineering, 10 Maneuver, 20 Jump, 240 Fuel, 600 Spacedock, 10 Staterooms, 2 Utility, 82 Cargo (+9 in turrets).

Statistics: EMass 615.475, LMass 1,070.475, Cost: MCr119.1046, HP 63,600. Hull Size Modifier: +10.

Performance: Accel 0.93 Gs, Jump 1.

3,000-TON *PYTHEAS*-CLASS EXPLORATORY CRUISER

One of the largest ship classes in the Scout Fleet, the *Pytheas* class is used for long-range expeditions outside Imperial space. It is more heavily armed and defended than most IISS ships, able to hide, run or fight as appropriate.

The *Pytheas* is an extremely versatile ship. It contains a large spacedock with a variety of modular fittings, able to handle almost any combination of vehicles up to 200 displacement tons. On a scientific mission, the ship might carry several modular cutters for planetary exploration. Or it might carry one or two *Suleiman*-class scout/couriers, using them to visit less-interesting systems to either side of the mother ship's path. Meanwhile, the cruiser's main cargo bay is directly aft of the spacedock, with a large access ramp



connecting the two. A variety of ground vehicles can be stored there, brought forward for loading into the ATV cradles of a modular cutter as needed for delivery to a planetary surface.

The *Pytheas* is also used in an intelligence-gathering role, performing deep penetration into potentially hostile territory. The ship is very stealthy, and its scientific instruments are designed to be reconfigured for signals intelligence with minimal effort.

The crew roster varies widely, depending on the ship's current mission. Typical crew size is 60-70 people. On a typical long-range exploratory expedition, there might be 66 crew: 10 command crew from Scout Fleet, 36 scientists from Survey or Exploration, 4 engineers from Technical Services, 15 tactical officers from Security, and 1 medical officer. Many crew members would hold some expertise outside their own department, allowing a flexible response to emergencies. On a potential combat mission, the crew roster would be more slanted toward Security and Intelligence.

One of the less-appreciated features of the *Pytheas* is its lack of creature comforts. The crew must double-bunk, the staterooms are a trifle cramped, and there is little common space set aside for crew recreation. Fortunately there is plenty of computer capacity aboard for recreational use between missions. Meanwhile, many a scout has earned a reprimand for reprogramming the survey center for a real holoventure...

The *Pytheas* class is named for famous pre-spaceflight explorers from the histories of many worlds.

Crew: As noted above.

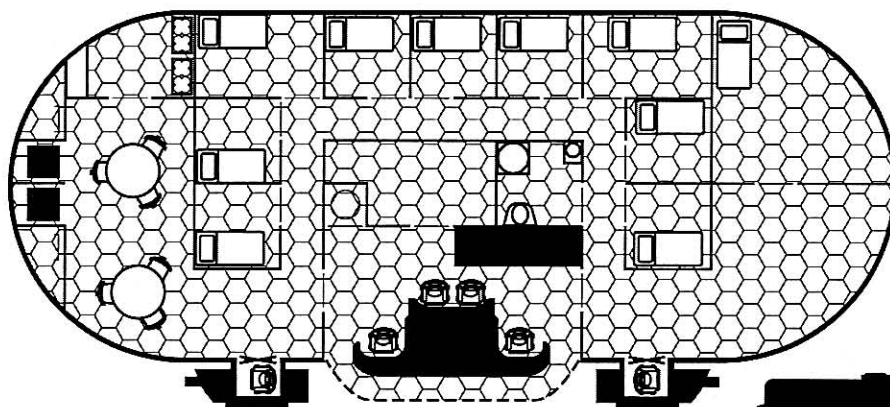
3,000-ton SL Hull, DR 100, 15 turrets (3 triple missile racks, 7 triple sandcasters, 5 triple lasers), Radical Stealth, Radical Emissions Cloaking, Command Bridge, Engineering, 120 Maneuver, 150 Jump, 1,200 Fuel, 400 Spacedock, 36 Staterooms, Sickbay, 20 Lab, Logistics, 4 Probe, 2 Survey, 6 Utility, Meson Screen, 4 Nuclear Damper, 6 Fuel Processor, 290 Cargo.

Statistics: EMass 3,764.725, LMass 5,710.725, Cost: MCr867.98, HP 138,000. Hull Size Modifier: +11. LMass and Cost figures assume 480 tons and MCr85 in carried vehicles, missiles and probes.

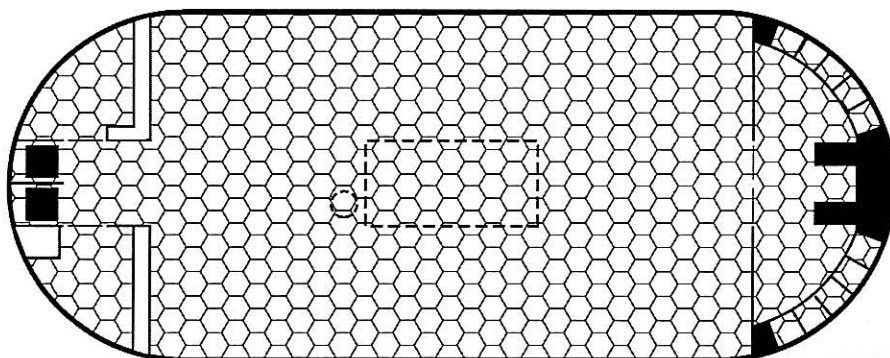
Performance: Accel 2.1 Gs, Jump 4, Air Speed 3,130.

1,000-TON *PURCELL*-CLASS XBOAT TENDER

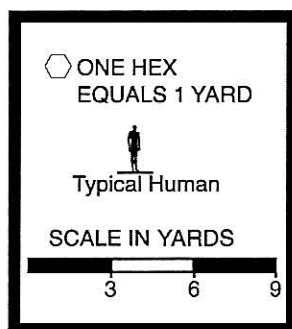
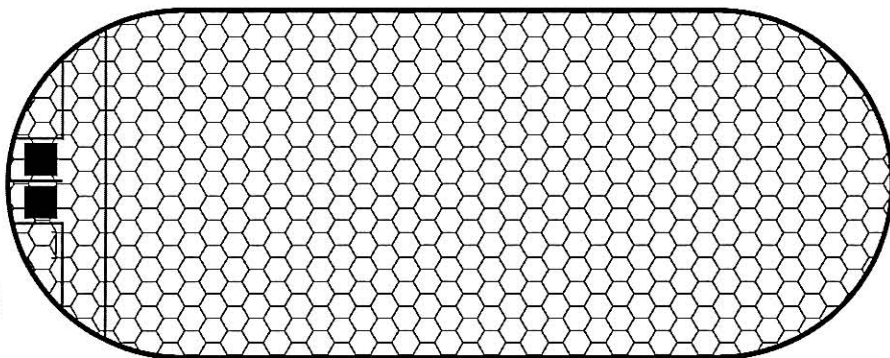
**BRIDGE
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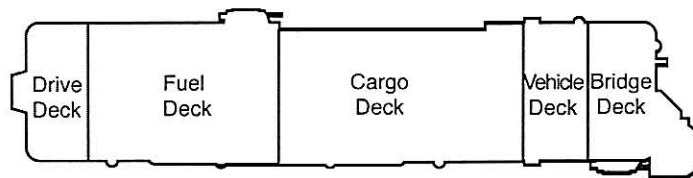


**CARGO
DECK**

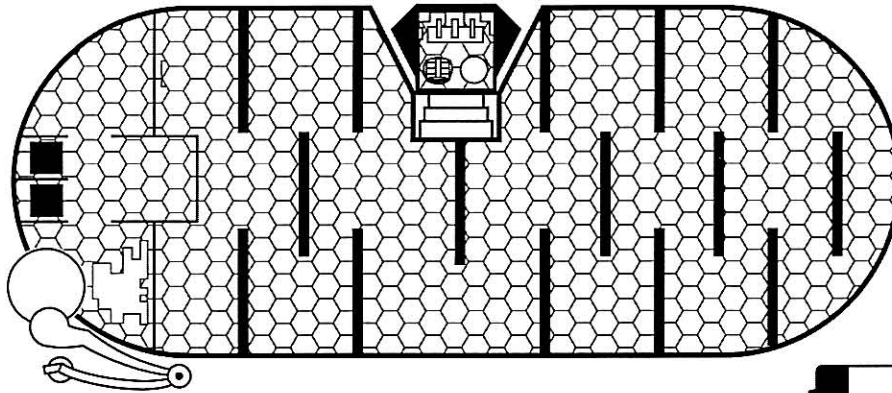


**VEHICLE
DECK**

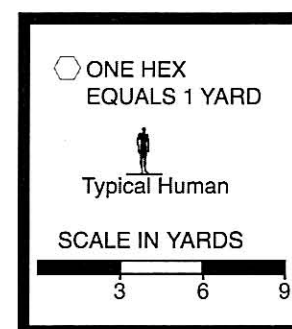
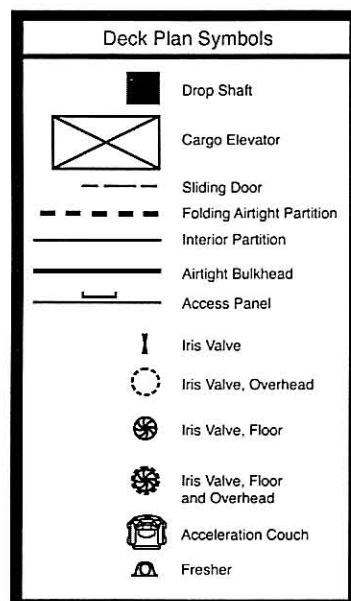
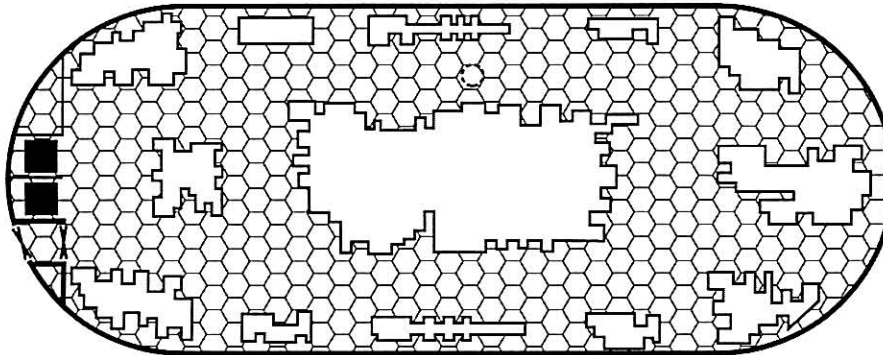




FUEL DECK



DRIVE DECK



CHAPTER FOUR

Stars

Resources

Everything in this chapter (and in much of Chapter 5) is in the domain of *astrophysics*. A good undergraduate-level text on the subject will be useful for anyone who wants to understand the background to these rules. We suggest *An Introduction to Modern Astrophysics*, by Bradley W. Carroll and Dale A. Ostlie.

Short of a rigorous study of astrophysics, there are many good books on astronomy for the layman. The best is probably the three-volume *Burnham's Celestial Handbook*, by Robert Burnham, Jr. The *Handbook* is a comprehensive introduction to deep-sky astronomy. It's slightly dated, but even so it provides an extensive introduction to astronomical concepts, and is very rich in detail.

Another good source is *The Guide to the Galaxy*, by Nigel Henbest and Heather Couper. This book includes a review of the history of galactic astronomy, explaining all the major concepts, and including visually stunning maps of the Galaxy at several levels of detail.

Finally, the best source intended for science fiction writers (and GMs) is *Worldbuilding*, by Stephen L. Gillett. Gillett covers most of the concepts useful to a world-builder, without too much mathematical detail. His book was a major starting point for the rules systems here.

"The use of robots has considerably reduced the casualty rate in first contact situations, especially with unexpectedly xenophobic cultures – except, of course, among the contact robots."

– *Twenty Years in the IISS*,
Janos Projaska

In *Traveller*, world-building begins on a grand scale. The Third Imperium (or your own *Traveller* universe) exists within the context of the whole Galaxy, a stage wide enough for almost any roleplaying game!

MAPPING THE GALAXY

Following *Traveller* and *GURPS Space*, we use the *parsec* as a standard unit of measurement for interstellar distances. One parsec is equal to about 3.26 light-years or 19 trillion miles.

Space is three-dimensional, but *Traveller* simplifies star-mapping by projecting the Galaxy onto a two-dimensional plane. Star maps are thus oriented with the *coreward* direction at the top, toward the center of the Galaxy. The opposite direction is *rimward*. The direction of galactic rotation is toward the left edge of a standard map, designating the *spinward* direction. To the right edge of a standard map is the *trailing* direction.

The map of Charted Space (see p. GT6) covers a region of the Local Arm, about 512 parsecs "wide" (spinward-to-trailing) and 320 parsecs "deep" (coreward-to-rimward). Charted Space is centered on the territory of the Third Imperium. This space is divided by Imperial astrographers into *sectors*, rectangular regions which are exactly 32 parsecs wide and 40 deep. Each sector contains roughly 400 to 500 stars. Each sector is divided further into 16 *subsectors*, which are 8 parsecs wide and 10 deep.

Mapping a Subsector

In the *Traveller* setting, space is mapped on a hexagonal grid, with each "hex" being one parsec across. Hence a sector is 32 by 40 hexes, a subsector 8 hexes by 10. Each subsector has a *system density*, indicating how likely it is for a star system to appear in each hex (see the System Presence Table). Most subsectors will be of Scattered or Standard density. For example, the entire Spinward Marches are of Scattered density. Very Dense subsectors do not occur, that density class only appearing inside very rich galactic clusters (see sidebar).

When mapping a subsector for the first time, choose a system density, then roll dice as indicated in the table for each hex in the subsector map. Place a star system in the hex if the target number or greater is rolled. Alternatively, the GM may simply place an appropriate number of star systems as he pleases (typical ranges of star system counts are given in the table).

System Presence Table

Subsector Density	Throw per Hex	Typical Number
Rift	12+ on 2d	2-3
Sparse	6+ on 1d	11-16
Scattered	5+ on 1d	21-32
Standard	4+ on 1d	32-48
Dense	3+ on 1d	43-64
Very Dense	2+ on 1d	53-80

GENERATING STARS

Here we begin an extended world design sequence, which will help *GURPS Traveller* GMs (and those running other science fiction campaigns) to design realistic worlds. The steps in this chapter will allow the GM to design star systems, determining what star(s) and planets each contains and determining their general properties. Using Chapter 5, the GM will be able to determine the specific characteristics of single worlds, and generate animal encounters. Using Chapter 6, the GM will be able to construct detailed descriptions for societies of sentient beings.

At many points in this process, a die-roll procedure will be presented to allow random selection among options. These procedures can be used to do fairly realistic world-building at random. Always remember that the rules should be considered *guidelines*, an indication of which options are more likely than others according to current scientific theory. No die roll should be allowed to dictate the course of the GM's campaign.

The design sequence here is based on the one from *GURPS Space*, although it is more detailed (and in some cases, more realistic). If these rules are used as written, they will sometimes yield results different from those in earlier versions of *Traveller*. In such cases we will describe the differences, and suggest ways to adjust the rules to better fit published *Traveller* material. As always, it's up to the GM to decide how to apply the rules to his personal game.

STEP 1: NUMBER OF STARS

Many stars have companions. Two or more stars may travel together through space, bound together gravitationally so that each orbits the center of mass of the system. In such systems, the component stars are generally named using letters of the alphabet, with the brightest component tagged A, the next brightest B, and so on. The A-component is also called the *primary* of the system, while the other components are *companions*.

Procedure

Roll on the Multiple Stars Table to determine how many stars are in the system. Modifiers: +3 if the system is a member of a true galactic cluster (see sidebar).

Multiple Stars Table

Roll (3d)	Number of Stars
3-10	1
11-15	2
16 or more	3



Multiple star systems with more than three members are possible but very rare. This possibility is taken into account in step 4.

Example

To demonstrate the world-building system in this book, we will use it to generate a star system for a *GURPS Traveller* campaign. The star system in question is somewhere in the trailing fringes of the Imperium, in a region for which little "official" information has been published. The GM wants there to be at least one more-or-less Earthlike planet in the system, but is willing to accept what the dice give him. He has a name in mind already for the planet: *Haven*.

He begins by rolling a 13 on 3d and consulting the Multiple Stars Table, finding that the Haven system contains two stars.

The Galaxy

Our galaxy is an "island universe" of stars, a little over 30,000 parsecs in diameter. It's a very typical spiral galaxy, in shape, size, and structure.

The Galaxy's most prominent feature is the *galactic disk*, a structure composed of gas, dust and bright young stars. This disk is about 600 parsecs thick, becoming thicker toward the galactic core. Its mass is not smoothly distributed. Most of the disk's matter falls in the *spiral arms*. These are not the smooth curves that most people imagine, sweeping out from the core to the fringes in a regular pattern. The densest parts of the arms fall into a series of short, discontinuous arcs, which piece together to form an overall spiral shape.

The disk is embedded in the *galactic halo*, a spherical structure that takes up most of the Galaxy's space. There is very little gas or dust in the halo, and only a few percent of the Galaxy's stars. The stars of the halo are old and dim, orbiting the core at wide angles to the plane of the disk. Strangely, it seems that the halo contains the majority of the Galaxy's mass, which must be in some "dark" form that isn't easily detectable.

The halo is densest toward the center of the Galaxy, where it shades into the *galactic core*. This is a flattened bulge, about 1,800 parsecs thick. Astronomers long believed that the galactic core had a roughly circular cross-section in the plane of the disk, but recent observations suggest that the core is actually somewhat elongated, making our Galaxy a moderate example of a "barred" spiral. The best current model of the Galactic bar makes it about 1,800 parsecs wide and 4,500 parsecs long, with its long axis forming a small angle with the line from Terra to the Galactic center.

Current observations indicate that Terra is near the plane of the galactic disk, about 7,700 parsecs from the center of the Galaxy. Published *Traveller* materials have established a longer distance, placing Terra at a little over 10,000 parsecs from the center. GMs may assume that Solomani astronomers mismeasured galactic distances in the last century before starflight...

Continued on next page...

The Galaxy

[Continued]

Sol is embedded in what Imperial astronomers call the Local Arm. This arm is about 1,800 parsecs across, and winds about halfway around the galaxy. The axis of the Local Arm passes about 100 parsecs rimward of Sol, so Terra is fairly close to the heart of the arm.

One major feature of the Local Arm is the Orion region, a territory rich with bright, young stars. This region is rimward of Sol, most of its bright stars at a distance of about 100 to 300 parsecs from Terra. The region is named after the constellation Orion, familiar to Terrans, since some of its brightest stars form the outlines of that constellation. Since these stars are actually very close together in galactic terms, Orion is one of the few star patterns which is visible and recognizable from much of Imperial space.

Opposite the Orion region is the Scorpius-Centaurus region, another area of rapid star formation containing many bright giant stars. This region is at the coreward fringe of Charted Space, although a few bright stars associated with it are actually in Imperial territory (notably Antares).



STEP 2: PRIMARY STAR TYPE

A star's most important properties are its mass, composition, age, and *luminosity* or brightness. With four important parameters, one might expect stars to vary widely, but in fact they fall into a few very well-defined groups. Astronomers classify stars using their *spectral class*, which can be thought of as a way to sort stars by color and size.

The first component of the spectral class is the star's *spectral type* or "color," denoted by a single letter. The major spectral types are O, B, A, F, G, K, and M. This sequence also defines the relative surface temperature and luminosity of stars. O and B stars are hot and very bright, while K and M stars are cool and dim. We will sometimes refer to spectral types as "early" (toward the bright, hot end of the range) or "late" (toward the dim, cool end). This nomenclature comes from the early days of stellar astronomy, when it was widely believed that all stars began their lives as O or B class and slowly moved down to K and M class before dying. This theory of stellar evolution has long since been discredited, but the "early late" jargon persists.

The spectral type can be further specified by a decimal classification, using the digits 0 through 9. 0 indicates a "standard" star of that spectral type, while 1 through 9 indicate progressively cooler, dimmer stars. Sol, for example, is spectral type G2, and can be considered two-tenths of the way between a standard G-class and a standard K-class star.

The second component of spectral class is the star's *luminosity class* or "size," which is denoted by a Roman numeral. Luminosity and size are related; two stars with the same spectral type (i.e., the same surface temperature) will be of different brightness if one is larger and has more surface to radiate energy with. The luminosity classes are I (for supergiant stars), II and III (for giant stars), IV (for subgiants), V (for average-sized "dwarf" stars) and VI (for a rare class of "subdwarf" stars). The rules that follow simplify by referring only to classes I, III and V, which should suffice for the vast majority of stars.

Most stars are class V, existing on the "main sequence" of star types. Members of the main sequence are mature and stable, shining by means of hydrogen fusion. The most massive main sequence stars (O through A class) are rare. Running through their nuclear fuel quickly, they burn out long before planetary systems or life-bearing worlds can form. Medium stars (in the range F through K) are much more common. They are stable long enough for planets to form and life to evolve. Finally, the M-class "red dwarf" stars are so common that over half of all stars belong to their class. Red dwarf stars are so stingy with their fuel that some of them may still be burning a trillion years from now.

One set of stars does not fall into this classification scheme: the *white dwarf stars*. In one sense, these are not stars at all. A white dwarf is the remnant of a star which has finished its stable lifespan on the main sequence, passed through a period as a giant star, and finally found itself unable to continue fusion burning. Stars which die in this fashion lose much of their mass, in processes that may be more or less violent. The most common remnant of such a star-death is a white dwarf, a small but extremely dense body which shines dimly due to the retained heat of its final collapse. White dwarf stars may have planets but are too dim to foster any kind of life on them. We use luminosity class D without spectral type for all white dwarf stars, simplifying the standard classification scheme for them. Other kinds of stellar remnants exist (see sidebar, p. 49).

Procedure

To generate the primary star, roll first on the Luminosity Class Table. If the star is known or intended to have an Earthlike world present, don't bother rolling. In this case, the star will automatically be of type V, on the main sequence.

Luminosity Class Table

Roll (3d)	Class
3	III (Giant)
4-14	V (Main Sequence)
15-18	D (White Dwarf)

The table does not allow for the random appearance of type I supergiant stars. These are so rare that the GM must deliberately choose to place them (no more than one per sector, and normally none).

With the luminosity class established, roll 3d on the Spectral Type Table (unless the star is a white dwarf). If the star is of class V and is known or intended to have an Earthlike world present, roll 1d+5 instead. This table does not allow for the random appearance of type O or B stars. Again, these stars are very rare and should be placed sparingly by the GM.

Spectral Type Table

Roll (3d)	Spectral Type
3-4	A (White)
5-6	F (Yellow-White)
7-8	G (Yellow)
9-10	K (Orange)
11-18	M (Red)

Finally, roll 1d to determine the star's spectral subtype. On a 1-3, the star is subtype 0, on a 4-6 it is of subtype 5. If you want a more detailed approach that uses the full range of spectral subtypes, see the sidebar on p. 53. Ignore or re-roll any result that might yield a star of type O4 or earlier, or any type O star of class III.

Example

The roll on the Luminosity Class Table is a 10, so the Haven system's primary star is a class V main sequence star. This isn't surprising, but it does mean that an Earthlike planet is still possible. The GM then rolls an 10 on the Spectral Type Table, finding that the primary is of type K. He rolls 1d for a 2 and then (using the Detailed Star Generation sidebar) 1d-1 for a 2, so the star's final spectral class is K2 V.



Three-Dimensional Mapping

The *Traveller* system simplifies star mapping by placing every star in a two-dimensional plane. Three-dimensional mapping is more complicated, but can add flavor. The following suggestions can be applied in campaigns outside the Third Imperium setting.

As suggested in *GURPS Space*, the best way to produce a 3-D star map is to use grid paper, with a scale of one parsec to the grid square. The plane of the paper represents the plane of the galactic disk. When a star is placed on the paper, a "height" coordinate is noted for it. A positive height represents distance above the galactic plane, while a negative height represents distance below the plane. As in *Traveller*, the top edge of the map points toward the galactic core, while the left edge of the map points in the spinward direction. The direction of positive height (up from the plane of the map) is normally called Galactic North, while Galactic South is in the direction of negative height. This convention is consistent with standard astronomical practice, but is different from the one found in *GURPS Space*.

In the region of Sol, there is about one star system per 20 cubic parsecs. This can be matched by rolling 3d for each grid point and distinct altitude on the map, placing a star system on a 6 or less. Or we can divide the volume of the space being mapped by the system density, and place about that many stars at random. In this case, the height coordinates for star systems should also be determined randomly, using any convenient method.

Three-dimensional geometry will have a number of implications which can drastically affect a campaign. One result is that starships with longer range can reach many more possible destinations. In two-dimensional space, the average number of stars that can be reached in one jump goes up as the *square* of the jump range. In three-dimensional space, the number of stars goes up as the *cube* of the range. No matter what the task, faster ships will have a greater advantage than they do in standard *Traveller*. Another effect is that interstellar empires will be more "compact." Distances from core to frontiers will be shorter, so those frontiers will be easier to control. The frontiers may be *harder* to defend, however, since the empire will have to guard the entire surface of a sphere.

In any case, the GM will need to consider the effect of these changes very carefully when designing his campaign. Any campaign using the idea will have a different "feel" than the standard Third Imperium setting.

Galactic Clusters

Stars are not normally born alone. They form in great families, dozens or even hundreds of stars coalescing at about the same time in one of the Galaxy's dark nebulae. Sometimes these groups remain bound by mutual gravitational attraction, continuing to travel together long after they leave the region where they formed. Such *galactic clusters* or *open clusters* are fairly common. There are several in the immediate neighborhood of Sol itself.

GMs may place galactic clusters in their own star maps for *Traveller*. Simply choose a single hex for the center of the cluster, and assume that the cluster includes one or two hex rings around this center hex. Within this area, the system density will be one or two classes higher than in the rest of the subsector. When generating stars within the galactic cluster, the GM should make sure that every star is the same age (see p. 52).

Galactic clusters are likely places to find thriving interstellar communities. Since all the stars formed in the same protostellar nebula, they are likely to have the same composition and have similar planetary systems.



Some clusters are very rich in Earthlike planets or certain valuable resources, for example. Also, since the stars are packed so close together, travel and trade between them is easy.

In many regions of space, stars appear to congregate by pure coincidence. In the Third Imperium, the IISS calls such regions *system clusters*, shortened to *clusters* in popular usage. While the close proximity of such stars makes travel between them convenient, the members of such a "false cluster" are not the same age and may have very different composition.

STEP 3: COMPANION STAR TYPES

By definition, the primary star is the brightest one in the system. Any companion stars must be of the same or lower luminosity class, and if of the same class must be of the same or lower spectral type. It seems common, however, for stars in a multiple system to be of about the same mass, and therefore of similar spectral type.

Procedure

If the primary star is of luminosity class D, its companions are automatically of class D as well. Otherwise, for each companion star in the system, begin by rolling 1d. On a 1-4 the companion is of the same luminosity class as the primary. On a 5 the companion is one class lower, and on a 6 it is two lower. For this purpose, the hierarchy of luminosity classes, highest to lowest, is I-III-V. If a companion "falls off the end" of this scale, roll 1d again. On a 1-4 the star is a class V main-sequence star, automatically of type M. On a 5-6 the star is a white dwarf of type D.

If the companion is of the *same* luminosity class as the primary star, then roll 1d. On a 1-3 the companion is of the same spectral type as the primary. On a 4 the companion is one type later, on a 5 it is two later, on a 6 it is three later. For this purpose, the hierarchy of spectral types, earliest to latest, is O-B-A-F-G-K-M. If a companion "falls off the end" of this scale, it is automatically of type M. Generate a subtype for the companion as in Step 2 (possibly with the sidebar). Ignore and reroll any result that would make the companion of the same spectral type as the primary *and* a higher subtype.

If the companion is of a *lower* luminosity class other than D, and hasn't already been assigned to spectral type M, then generate a spectral type as in Step 2, accepting any result.

Example

The GM now needs to determine the spectral type of the companion star in the Haven system. He rolls 1d for a 5, indicating that the companion is one luminosity class lower than the primary, falling off the end of the scale. The GM rolls 1d again for a 3. The companion star is a main-sequence red dwarf of type M. The GM rolls 1d for a 5 and 1d-1 for a 0, fixing the full spectral type at M5 V.

STEP 4: COMPANION STAR ORBITS

Stars in a multiple system follow orbital paths that circle the center of mass of the system. We simplify by assuming that companions follow circular or elliptical paths centered around their primary stars.

We measure distances within star systems in *astronomical units* (abbreviated AU). One astronomical unit is equal to the average distance between Terra and Sol, about 93 million miles. The relevant parameters of an orbital path are its average radius and its *eccentricity*. This last is a measure of the amount by which the orbit deviates from a perfect circle, and takes values between 0 and 1. An value of 0 indicates a perfectly circular orbit, while values approaching 1 indicate elliptical paths that are more and more elongated.

Members of a multiple star system can fall at a variety of distances from each other. At one extreme are "contact binaries," stars whose outer atmospheres actually mingle as they whirl about each other in hours or days. At the opposite extreme are very wide pairs, which may take thousands of years to complete an orbit. Stars tend to have orbital paths of moderate eccentricity.

Procedure

Roll 3d on the Orbital Separation Table for each companion. Modifiers: +6 for the second companion in a trinary system.

Orbital Separation Table

Roll (3d)	Separation	Orbital Radius Multiplier
6 or less	Very Close	0.05 AU
7-9	Close	0.5 AU
10-11	Moderate	2 AU
12-14	Wide	10 AU
15 or more	Distant	50 AU

The initial result from the table gives a general idea of how widely separated the primary is from its companion. Roll 2d and multiply by the indicated Orbital Radius Multiplier to get a value for the average radius of the orbit for that companion. The GM may accept this value or choose a precise value close to it.

A Distant companion may have a companion of its own, on a roll of 11 or more on 3d. If so, the companion is treated in all respects as the primary for its own companion. Generate a spectral class for the "subcompanion" as in Step 3, and generate an average radius for the subcompanion's orbit around its primary, applying a -6 modifier to the 3d roll.

Once the average orbital radius for each primary-companion pair is determined, roll on the Orbital Eccentricity Table for each. Modifiers: -6 if the two stars are Very Close, -4 if they are Close, and -2 if they have Moderate separation.

Orbital Eccentricity Table

Roll (3d)	Eccentricity
3 or less	0.05
4	0.1
5	0.2
6	0.3
7-8	0.4
9-11	0.5
12-13	0.6
14-15	0.7
16	0.8
17	0.9
18 or more	0.95



For each primary-companion pair, compute and record the *minimum separation* and the *maximum separation* of the two stars.

$$\text{Min. separation} = (1 - E) \times R$$

$$\text{Max. separation} = (1 + E) \times R$$

E is the eccentricity of the companion's orbit, and **R** is the average orbital radius for the companion in AU. The minimum and maximum separations will be in AU.

Example

The GM now turns to the Orbital Separation Table, rolling 3d for an 11. The two stars in the Haven system have Moderate separation. He rolls 2d for an 7, finding that the two stars have an average separation of 14 AU. He then rolls 3d-2 on the Orbital Eccentricity Table, getting a 14. The orbit has a rather unusual eccentricity of 0.7. The minimum separation of the two stars is 4.2 AU, the maximum separation is 23.8 AU.

Stellar Remnants

Some of the most interesting objects to be found in deep space are the remains of dead stars. This interstellar bestiary includes some very exotic objects.

White dwarf stars are only a few thousand miles across. They shine because of the internal heat generated during their final collapse, retained over billions of years. The surface temperature of a white dwarf star can be very high, but their small radiating surface makes them dim. Most white dwarf stars are composed of ionized carbon and oxygen nuclei, existing in a *degenerate* state of very high density.

If the planetary system of a white dwarf star is to be generated, ignore its effective temperature. Unless the white dwarf formed very recently in cosmic terms, its luminosity will be less than 0.001 solar units. Its mass will be 0.14 + (3d × 0.04) solar units. A few white dwarf stars are more massive, although the maximum mass for such a stellar remnant is 1.44 solar units.

Planetary nebulae are associated with very "young" white dwarf stars. During the last period of a giant star's life, it loses mass from its outer layers. At the climax of this process, a significant portion of the star may simply stream off in all directions. This creates a planetary nebula, so-called because (seen from a distance in a small telescope) it looks very much like the disk of a planet. The nebula consists of a shell of hot gas, which glows due to radiation from the new white dwarf star at the center. Planetary nebulae can be up to about a parsec in radius. They normally only last about 50,000 years, after which the expanding shell of gas dissipates into interstellar space.

Planetary nebulae are uncommon, since they only exist very early in a white dwarf star's lifespan. There are perhaps 1-3 such nebulae in Charted Space. The GM may wish to place them around a few white dwarf stars already on sector maps, for local flavor. The white dwarf star associated with a planetary nebula will be unusually luminous, since it still retains almost all of its heat of collapse. Assume that such a white dwarf has mass as described above, but has luminosity of 3d × 0.01 solar units.

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Stellar Remnants

[Continued]

Neutron stars form during the violent death of more massive stars. Stars with more than about 8 solar masses can't simply shed their outer layers and settle into a white dwarf state. Instead, they experience a *supernova explosion*. For a very short time, the dying star outshines the rest of the Galaxy put together. The core of the star is too massive to stabilize as a white dwarf, instead collapsing into an incredibly dense sphere only a few miles across.

Many neutron stars rotate very quickly and have extremely powerful magnetic fields. They act as great particle accelerators, spewing out beams of energetic radiation that sweep the sky as the neutron star rotates. Such an object is called a *pulsar*, since if the observer is properly located to see the energy beams, the star seems to "pulse" in a very rapid and regular cycle.

A neutron star would be a dangerous (but interesting) object to visit. Since neutron stars are hard to detect, it's difficult to estimate how many there might be in our region of the Galaxy. The GM may assume that any white dwarf star on a sector map is actually a neutron star on a 3d roll of natural 18. Or he may simply place neutron stars on his sector maps, no more than one per 5-6 sectors. Assume that a neutron star has negligible luminosity and a mass of $1.5 + (1d \times 0.25)$ solar units.

Black holes are the ultimate in exotic astronomical phenomena. The core of a very massive star may not be able to stabilize as a neutron star. In this case, no force known to science can halt the process of collapse. As the core becomes increasingly dense, its gravitational field becomes more and more intense, until even light can no longer escape it. The mass of the stellar remnant has essentially dropped out of our Universe entirely, leaving behind a gravitational hole in space. The full properties of such an object are beyond the scope of this book, but GMs who are familiar with astrophysics may be interested in using black holes in their campaigns. GMs who are *not* comfortable with the physics should ignore the possibility. There are many misconceptions about black holes in the popular media and even in science fiction.

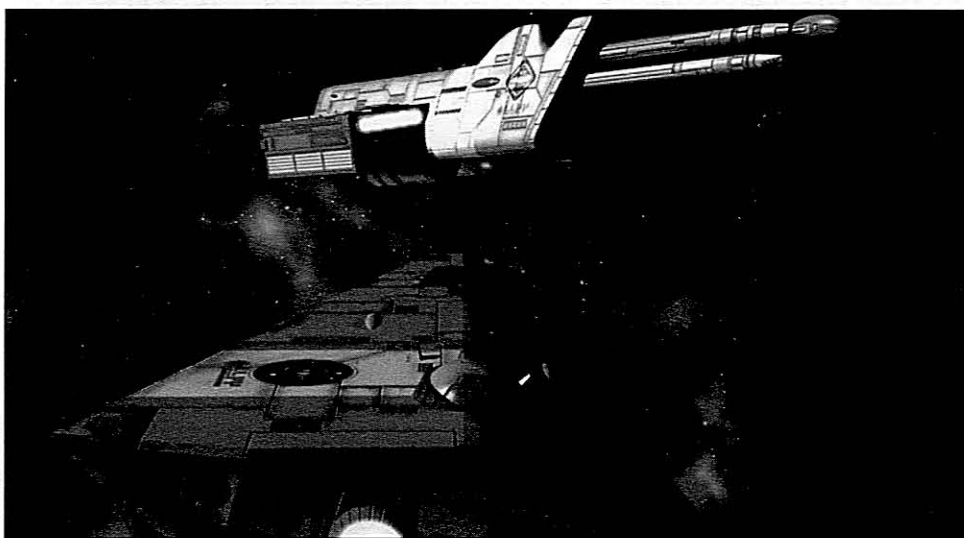
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STEP 5: STELLAR CHARACTERISTICS

The following tables show what characteristics a typical star of any given spectral class and type will have. The discussion of each item will suggest how the GM should use the tables to determine the exact properties of any given star.

Star Characteristics: Main Sequence (Class V)

Type	Temperature	Luminosity	Mass	Radius	Lifespan
O5	45,000	790,000	30	0.14	0.0
B5	15,000	830	5.4	0.040	0.1
A0	9,500	54	2.7	0.025	0.5
A5	8,200	14	1.9	0.017	1.4
F0	7,200	6.5	1.6	0.015	2.5
F5	6,400	2.9	1.3	0.013	4.5
G0	6,000	1.5	1.1	0.011	7.3
G5	5,800	0.79	0.94	0.0082	12
K0	5,300	0.42	0.81	0.0071	19
K5	4,400	0.15	0.62	0.0062	41
M0	3,900	0.063	0.50	0.0051	79
M5	3,200	0.011	0.21	0.0032	190
M8	2,600	0.001	0.063	0.0014	630



Star Characteristics: Giants (Class III)

Type	Temperature	Luminosity	Mass	Radius	Age
B5	15,000	1,800	7.0	0.058	0.0
A0	9,500	106	4.0	0.035	0.2
A5	8,200	43	2.5	0.030	0.6
F0	7200	20	1.5	0.027	3.0
F5	6,400	17	1.0	0.031	10
G0	6,000	34	1.0	0.050	10
G5	5,800	43	1.1	0.060	7.5
K0	5,300	60	1.1	0.085	7.5
K5	4,400	220	1.2	0.24	5.8
M0	3,900	330	1.2	0.37	5.8
M5	3,200	930	1.4	0.92	3.6
M8	2,600	1,100	1.6	1.5	2.4

Star Characteristics: Supergiants (Class I)

Type	Temperature	Luminosity	Mass	Radius	Age
O5	45,000	1,100,000	70	0.16	0.0
B5	15,000	52,000	20	0.31	0.0
A0	9,500	35,000	16	0.64	0.0
A5	8,200	35,000	13	0.86	0.0
F0	7,200	32,000	12	1.1	0.0
F5	6,400	32,000	10	1.3	0.0
G0	6,000	30,000	10	1.5	0.0
G5	5,800	29,000	12	1.6	0.0
K0	5,300	29,000	13	1.9	0.0
K5	4,400	38,000	13	3.1	0.0
M0	3,900	41,000	13	4.1	0.0
M5	3,200	300,000	19	17	0.0
M8	2,600	500,000	24	32	0.0

Effective Temperature

The *effective temperature* of a star is the temperature of the star's visible surface, measured in *kelvin*. It is the primary factor determining the "color" of the star's light (more precisely, the distribution of the star's radiant energy across the electromagnetic spectrum). Spectral type mostly depends on effective temperature, although the material composition of a star is also a factor.

Luminosity

The *luminosity* of a star is a measure of its total energy output. We will measure luminosity in "solar units," so that a star with luminosity 1 radiates exactly as much energy as the Sun. Note that not all of a star's radiant energy will be in the form of visible light. In fact, at the extremes of the range of spectral types, most of a star's output may be outside the visible range.

Luminosity depends on the entire spectral class of the star. The GM should refer to the Luminosity Table to get a base value. Real stars can vary somewhat from these standard values.

Once a star's effective temperature and luminosity have both been determined, its physical size can be computed. The tables give typical stellar radii in AU. This figure is of interest for *Traveller* because jump drives don't function reliably within 100 diameters of any large object. To get the 100-diameter distance for a star, multiply its radius from the table by 200.

Mass

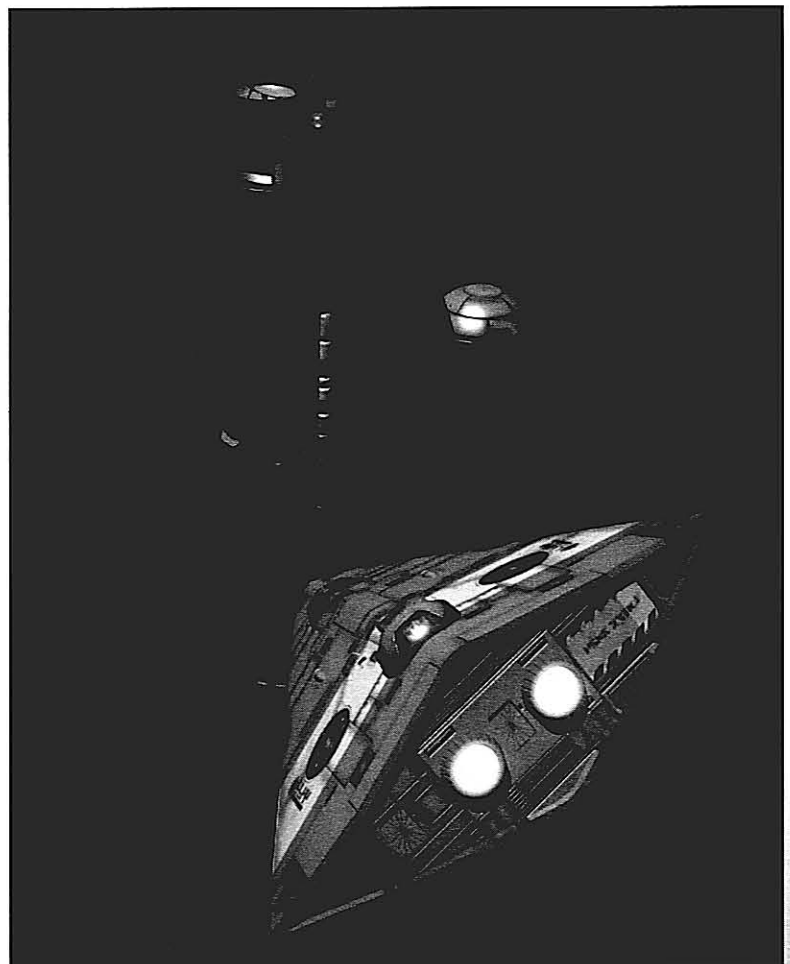
The mass of a star is also measured here in solar units, so that Sol has mass 1. For main-sequence stars, there is a close mathematical relationship between luminosity and mass, which we can use to compute the approximate mass from the luminosity. The similar relationship for giant or supergiant stars is too complex to compute from scratch. The tables give typical values for stellar mass.

Stellar Remnants

[Continued]

Black holes are even harder to detect than neutron stars, but they must be vanishingly rare. No *Traveller* campaign should include more than one. A black hole has negligible luminosity and a mass of $2.5 + (1d \times 0.5)$ solar units.

It's known that stellar remnants can have planets. When generating such bizarre planetary systems, GMs should feel free to modify the procedures in this book as they see fit. A few rules of thumb: the original main-sequence star probably had about 5 times the mass of the stellar remnant. Planets close in to the star were likely destroyed during its giant phase. A supernova explosion might destroy all planets, although this would leave behind debris which might form a new planetary system *after* the explosion. Such a system would not contain any gas giant planets.



Flare Stars

Not all stars shine steadily. Due to a variety of physical processes, some stars change in size and brightness, sometimes on a strongly regular schedule.

Flare stars are the variables most likely to be encountered by adventurers. They are red main-sequence stars, most of them of type M3 and later. At irregular intervals they experience a sudden rise in luminosity. These events are the result of flares on the surface of the star, very similar to those experienced by Terra's sun, but much larger in proportion to the small, cool red dwarf.

Flare stars seem to experience some flare activity almost constantly, since most of the known examples are subject to very frequent fluctuations of up to 50% in brightness. However, every few hours or days a *big* flare comes along, increasing the star's luminosity by as much as 100 times. These events are always very short, usually lasting only a few minutes.

An inhabited planet circling such a star would probably experience a "heat pulse" after such a monster flare, raising local temperatures by a noticeable amount. Also, since the flares are much hotter than the star's normal surface, they light they give off is relatively rich in ultraviolet. Creatures living on a planet of a flare star would normally get very little UV, but would have to adapt to sudden massive doses at irregular intervals. Plant life might actually *use* the flares to kick into photosynthetic high gear, taking advantage of the short flood of useful light. Unfortunately, a flare would also dump charged particles into the planet's atmosphere, raising the level of ionization, disrupting radio traffic and possibly causing spectacular aurorae.

Most flare stars are very obvious about their status, but it's possible that all red dwarf stars have some potential for big flares. An M-class star that is *believed* to be calm and well-behaved might present adventurers with an interesting challenge if it suddenly decides to flare . . .

"One of the perils of lecturing in astrography is that during the lecture on the age of stars, some joker is almost certain to ask if some research station is working on stellar anagathics. While I appreciate a sense of humor in cadets, I prefer that they leave actual comedy to professionals."

*– Twenty Years in the ISS,
Janos Projaska*

Age

If a star is on the main sequence, its luminosity and mass yield its *stable lifespan*. This is the length of time that it can be expected to stay on the main sequence after its formation (barring outside influences). For main-sequence stars, the "Lifespan" column of the table gives the stable lifespan in billions of years.

To determine the age of a main-sequence star, the GM may arbitrarily choose an age that is less than the star's stable lifespan. If the stable lifespan is greater than 12 billion years, the GM should choose an age less than that figure. Very few stars in the galactic disk are older than 12 billion years, and those few are probably stars of the galactic halo that just happen to be passing through the disk. The GM should *never* choose an age greater than about 16 billion years, since that's a good estimate for the beginning of star formation in the embryonic Galaxy.

Alternatively, the GM may roll 3d on the Age Table to determine what *population* the star belongs to. Population II stars are the oldest, leftovers from the formation of the Galaxy. Population I stars were formed in the galactic disk and can be much younger. Once the population is determined, roll 1d-1, multiply the result by 0.5 billion years, and add the result to the base age as indicated on the table. The result will be an approximate value for the star's age (the GM should feel free to vary this slightly if he wishes). Ignore and reroll any result that gives an age greater than the star's stable lifespan.

Age Table

Roll (3d)	Population	Base Age
3-6	Intermediate Population I	0 billion years
7-10	Old Population I	3 billion years
11-14	Disk Population	6 billion years
15-17	Intermediate Population II	9 billion years
18	Halo Population II	12 billion years

The age of stars of luminosity classes I or III is determined differently. Once stars leave the main sequence, they tend to proceed through their time as a giant or supergiant star very quickly. Their age is therefore slightly more than the stable lifespan of a main sequence star of about the same mass. The tables for giant and supergiant stars give typical values for age. Notice that many of these stars have an Age of 0.0 billion years. These stars can be no more than a few million years old.

Multiple star systems are composed of stars which formed together and are therefore of the same age. The GM should determine the age of the system by working with the component whose range of possible ages is most restricted. For example, if a giant star is present, its range of possible ages is narrowest and its age should determine the age of the system. If all the stars in the system are on the main sequence, then the star with highest spectral type (and thus, shortest stable lifespan) should be used to determine the system's age.

It's possible that a randomly generated set of primary and companion stars has no possible age in common. In this case, the GM can simply fix a reasonable age for the system, ignoring the anomaly. Stars in multiple systems *do* often evolve differently from those without companions. Or the GM can simply alter the contents of the system until a consistent age can be assigned.

Note that current theories of planetary formation hold that it takes a fairly long time for the process to run to completion. Stars which are less than 500 million years old probably do not have actual planets as yet, only a disk of dust and planetoids, with perhaps a few growing proto-planets in the mix. We assume that main sequence stars of type earlier than A0 will not normally have planets.

Stars that are very *old* may not have planetary systems either, if they formed in nebulae that had not yet been enriched in heavy elements by earlier generations of stars. Any planets that are associated with such stars are likely to be gas giants. We will suggest no rule for generating such planetary systems, but the GM is free to adjust the procedures given here for stars which are (say) more than 10 billion years old.

Example

The GM decides to ignore the Haven system's red-dwarf companion and concentrate on developing the K2 V primary star. He refers to the Star Characteristics Table for class V and uses interpolation to get a value of 4900 K for the effective temperature. Interpolation for luminosity yields a value of 0.31 solar units.

The rest of the star's characteristics have to be computed by hand, since the GM used interpolation for effective temperature and luminosity. He refers to the Detailed Star Generation sidebar and applies the formulae there. The star's radius turns out to be 0.0072 AU, its mass 0.75 solar units. The star's stable lifespan is about 24 billion years. The GM decides to roll on the Age Table, getting an 11, which indicates an Old Population I star. He rolls 1d to get a 2, so the age is about 4 billion years. This age is consistent with the stable lifespan for both the primary and companion stars, so the GM accepts it.

GENERATING PLANETARY SYSTEMS

Once a star's characteristics have been determined, the GM can sketch out the contents of the attached system of planets. We assume here that the GM is working with a single star. If a multiple star system is being created, these steps should be repeated for each member of the system.

STEP 6: LOCATE ORBITAL ZONES

Every system of planets has a specific structure, determined by the physical processes that occurred during the system's formation. Normally, small rocky planets form close in to the primary star, while gas giants take shape at greater distances. We will compute several orbital distances that are important when determining what planets will be in which positions.

The presence of a companion star complicates these calculations. As a general rule, if a pair of stars has Very Close separation, simply add their masses together, add their luminosities together, and treat them as a single star with the resulting mass and luminosity for the purpose of these computations. This will require that the detailed star generation rules be used (see sidebar). If the stars are separated more widely, treat them as separate stars (but see *Forbidden Zones* below).

Detailed Star Generation

GM's who wish to incorporate a bit more realism into star generation may use the following procedures.

First, the GM can use the full range of spectral subtypes. Once the spectral class has been determined as far as the subtype (0 or 5) using the rules in the main text, roll 1d-1, rerolling any result of 5. Add the die roll result to the spectral subtype. This procedure will yield the full range of subtypes, from 0 to 9. Stars of type M9 do not seem to exist, so reroll any such result.

When using complete spectral subtypes, a star's effective temperature and luminosity can be derived from the appropriate tables through a process of *interpolation*. When a spectral type falls between two values on the tables, divide the difference between the two values by the number of steps, to get the difference per step. Multiply this difference by the number of steps the desired value is away from the lower of the two, and add the result to the lower value. The result is the value for the exact spectral type.

For example, the GM wants to determine the effective temperature for an F8 V star. F8 falls between F5 and G0, which have temperatures of 6400 and 6000 K. There are five steps in this range, so the difference per step is $(6400 - 6000)/5 = 80$. F8 is two steps above the lower value, so the effective temperature for the F8 star is $6000 + (2 \times 80) = 6160$ K.

Another way to add detail is to introduce some variance to a star's characteristics. Luminosity, in particular, varies significantly even for stars of the same spectral class. The GM may multiply the value from the table by $0.79 + (3d \times 0.02)$ to get a precise value for the luminosity. This yields a maximum variation of about 30%, which is actually conservative for most of the main sequence.

Once effective temperature and luminosity are known, the star's radius can be computed. Use the following formula:

$$D = 309,000 \times \text{Square root of } L / T^2$$

Here, **D** is the star's diameter in astronomical units. **L** is the star's luminosity, and **T** is its effective temperature in kelvin. Carry this computation to two significant figures. Almost all main-sequence stars will be a small fraction of an AU in diameter, while giant stars may be *much* larger.

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Detailed Star Generation

[Continued]

For main-sequence stars, the mass can also be estimated from the luminosity. For stars of class O5 V through K9 V, use:

$$M = \text{Fourth root of } L$$

For red dwarf stars of spectral types M0 V through M8 V, use:

$$M = 2 \times \text{Square root of } L$$

In both cases, **M** is the star's mass in solar units, and **L** is its luminosity in solar units. If you choose your own value for a main sequence star's luminosity, you may wish to use these formulae to get a precise value for the star's mass. Since a similar simple relationship doesn't hold for stars of class I or III, the GM may use interpolation to get the mass for them.

A main sequence star's stable lifespan follows from its mass and luminosity:

$$S = (10 \times M) / L$$

Here, **S** is the stable lifespan in billions of years, **M** is the star's mass in solar units and **L** is its luminosity in solar units. Use the tables in the main text to determine the approximate age of a giant or supergiant star, interpolating if necessary.

When generating stars using the detailed method, the various zone distances will have to be computed from scratch. For all of the following formulae, **R** is the distance being computed, **M** is the star's mass in solar units, and **L** is the star's luminosity in solar units. The inner limit distance can fall at one of two values:

$$R = 0.2 \times M$$

$$R = 0.0088 \times \text{Square root of } L$$

Compute both possible distances and take the larger of the two. The second formula normally only "wins" if the star is *extremely* luminous, as for O-class main sequence stars and some giants. For almost all main sequence stars, it's enough to compute the inner limit radius using the first formula.

The inner and outer edges of the life zone are at:

$$\text{Inner edge: } R = 0.95 \times \text{Square root of } L$$

$$\text{Outer edge: } R = 1.30 \times \text{Square root of } L$$

Meanwhile, the snow line is found using:

$$R = 5.00 \times \text{Square root of } L$$

Finally, to compute the outer limit distance:

$$R = 40 \times M$$

We assume that the outer limit distance is no less than 10 AU. This minimum usually only affects the planetary systems of red dwarf stars.

Zone Distances

For main sequence stars which are likely to have planets, refer to the Orbital Zones Table. If developing a star system not in this set, use the detailed star generation rules.

Orbital Zones Table

Type	Inner Limit	Life Zone	Snow Line	Outer Limit
A0	0.54	7.0-9.6	37	110
A5	0.38	3.6-4.9	19	76
F0	0.32	2.4-3.3	13	64
F5	0.26	1.6-2.2	8.5	52
G0	0.22	1.2-1.6	6.1	44
G5	0.19	0.84-1.2	4.4	38
K0	0.16	0.62-0.84	3.2	32
K5	0.12	0.37-0.50	1.9	25
M0	0.10	0.24-0.33	1.3	20
M5	0.042	0.10-0.14	0.52	10
M8	0.013	0.03-0.04	0.16	10

The *inner limit distance* is the radius of the smallest possible planetary orbit for the primary star. Closer than that, planets will not form, either because a stable planetary orbit is too unlikely or because the star's heat is so great as to vaporize rock.

The *life zone* is the range of orbits in which a planet can maintain Earthlike temperatures, allowing liquid-water oceans to exist for long periods of time.

The *snow line* is the orbital radius at which water ice was able to stay frozen during the formation of the planetary system. With ice available, protoplanets are more likely to enter a runaway growth process that ends in the formation of a gas giant planet.

The *outer limit distance* is the radius of the largest possible planetary orbit for the primary star. Further out than that, the material for planetary formation is too thinly spread to allow planets of significant size to form. There will be a great deal of "junk" at and beyond this orbital radius, of course (see sidebar).

Forbidden Zones

If the star is a member of a multiple star system, planets will not form at certain distances. The presence of a companion star makes a stable planetary orbit impossible in these zones.

The inner edge of the band of forbidden orbits is at one-third of the minimum separation between the star and its companion (computed in Step 4). The inner edge of the forbidden zone may be closer than the inner limit distance computed above, in which case there will be no planets between the primary and its companion. Alternatively, the inner edge of the forbidden band may be beyond the outer limit distance, in which case the companion will have no significant effect on the planetary system.

The outer edge of the forbidden zone is at three times the maximum separation of the star and its companion. If this outer edge is closer than the outer limit distance, planets may form circling the pair as a whole. This can happen even when the stars are at fairly wide separations, although in this case the outer edge of the forbidden zone is likely to be beyond the outer limit distance.

The placement of forbidden zones may become very complicated in a system with three or more stars. In most cases, the GM should be able to take the stars singly or in pairs, and assume that any other members of the system are too far away to affect things.

Orbital Zones

Several times in the following steps, we will refer to the *orbital zone* a given planet falls into. A planet is in the *inner zone* if it is closer to the primary star than the inner edge of the life zone. The definition of the *life zone* should already be clear. The *middle zone* extends between the outer edge of the life zone and the snow line, while the *outer zone* runs from the snow line to the fringes of the star system.

Example

The GM now places orbital zones for the Haven system's primary star, again referring to the Detailed Star Generation sidebar. The inner limit distance for the star falls at 0.15 AU. The star's life zone runs from 0.53 to 0.72 AU, the snow line is at 2.8 AU, and the outer limit distance is at 30 AU. Haven's companion sometimes comes as close as 4.2 AU, so a forbidden zone exists in the system, its inner edge at 1.4 AU. The maximum separation is 23.8 AU, so the forbidden zone's outer edge is at 71.4 AU, well beyond the outer limit distance. All of the primary's planets, then, will be closer than the forbidden zone.

STEP 7: PLACE PLANETARY ORBITS

Planets tend to be spaced evenly on a logarithmic scale. That is, the ratio between one planet's orbital radius and the next is usually about the same throughout the system. To generate a set of planetary orbits, we will generate a Bode sequence (see p. S104).

Procedure

Roll 1d+1 and divide the result by 2, retaining fractions. Multiply that result by the inner limit distance. That product is the base orbital radius (D). Now roll 1d. On a 1-2 the Bode constant (B) is 0.3, on a 3-4 it is 0.35, on a 5-6 it is 0.4.

The innermost orbit will be at D AU, the second at (D + B) AU, the third at (D + 2B) AU. The rest of the orbital radii will be (D + 4B), (D + 8B), (D + 16B) and so on, doubling the B component each time. Continue generating this sequence until a radius falls outside the outer limit distance. When generating orbital radii, round the results of each computation to the nearest hundredth of an AU. Feel free to vary any orbital radius somewhat. A variation of up to 5% is reasonable, or more for the outermost orbits in a system.

In the case of a pair of stars at Very Close separation, again treat the stars as one when placing orbits. At wider separations, some orbits will probably fall into a forbidden zone. If so, continue to place orbits only for the primary star, and only if the forbidden zone does not extend all the way to the primary's outer limit distance. In Step 8, no object will be placed in an orbit within a forbidden zone.

Example

The GM rolls 1d+1 for a 3, divides by 2 to get 1.5, and multiplies this by the inner limit distance to get 0.23 AU. This is the radius of the system's innermost orbit (D). Rolling 1d again, the GM gets a 4, so the Bode constant B is 0.35. The Bode sequence can now be generated: 0.23 AU, 0.58 AU, 0.93 AU. The next term in the sequence would be in the forbidden zone, so the GM stops. The Haven system will have three planetary orbits: one in the inner zone, one in the life zone, and one in the middle zone.

Using Real Stars

GM's running campaigns for *Traveller* outside the Third Imperium setting may want to experiment with using real astrology. This is best done in conjunction with the "three-dimensional mapping" option described above.

When researching a real star, you may find that all of its important parameters are available. Some catalogues, however, will only give a star's spectral type and its *magnitude*, a measure of its visual brightness in the sky. Even so, from these two items the rest can be computed.

There are several possible magnitude measurements that might be found in a star list. The *apparent magnitude* is a measurement based on the star's apparent visual brightness in the sky. The *absolute magnitude* is similar, but has been corrected to allow for the star's distance. The *bolometric magnitude* has been further corrected to account for all of the star's radiation, including those portions outside the visual range. Each of these works on a *logarithmic* scale, so that the same difference in magnitude always means the same ratio in brightness.

To get luminosity from bolometric magnitude **B**, compute

$$A = 1.86 - (0.4 \times B)$$

Then raise 10 to the power of **A**. The result will be the star's luminosity. If your source doesn't list the star's bolometric magnitude, it will probably list the absolute magnitude. In this case, refer to the Bolometric Correction Table and find the *bolometric correction* for the star's spectral type. Add this quantity to the listed absolute magnitude, then proceed as above.

Bolometric Correction Table

Type	Correction
O5	-4.4
B0	-3.2
B5	-1.5
A0	-0.30
A5	-0.15
F0	-0.09
F5	-0.14
G0	-0.18
G5	-0.21
K0	-0.31
K5	-0.72
M0	-1.4
M5	-2.7
M8	-4.1



The mass of a star will probably be available only if it is a member of a multiple star system (since that's the only time astronomers can measure star mass directly). If not, then the mass-luminosity relationship given in the main text can be used to get the star's mass, as long as it is a main-sequence star. Continue with the rules in the main text to generate the star's planetary system.

Rhylanor (I)

We will use Rhylanor (Spinward Marches 2716) as an example of how the rules in this book can be used to flesh out the details of a world from published *Traveller* material. As we shall see, building Rhylanor from scratch is a challenge, but it can add depth to the world in one GM's personal *Traveller* universe.

Referring to published materials from an earlier version of *Traveller*, the GM learns that Rhylanor orbits a singleton star of spectral class M2 VI. In its star system there is one planetoid belt and *no* gas giants.

The rules here don't allow for class VI "subdwarf" stars, but the GM decides to break with the published material as little as possible and declares that Rhylanor's primary is an M2 V main-sequence star. He uses the rules from the Detailed Star Generation sidebar to generate the primary's characteristics. Its effective temperature is about 3600 kelvin, its luminosity 0.042 solar units, its mass 0.41 solar units. Its radius is 0.0049 AU, and its 100-diameter radius is about 0.98 AU. Its stable lifespan is 98 billion years. The GM rolls 3d on the Age Table and get a 10, indicating an Old Population I star, then rolls 1d-1 for a 0. The star is 3 billion years old.

Generating the star's orbital zones, he finds that the inner limit distance is at 0.082 AU, the life zone is between 0.19 AU and 0.27 AU, the snow line is at 1.0 AU, and the outer limit distance is at 16 AU. Since there is no companion star, there are no forbidden zones.

The GM refers to *Behind the Claw* and finds that Rhylanor is listed as having "Normal" climate. This implies that it must orbit somewhere near the inner edge of the life zone, just as Terra does around Sol. Given the ratio between the life zone distances and the inner limit distance, it's obvious that Rhylanor must occupy the innermost orbit of the system. The GM therefore decides not to roll randomly for this innermost orbit's radius, and sets it at 0.21 AU. He rolls randomly for the Bode constant and gets a 0.4. The Rhylanor system will have orbits at 0.21 AU, 0.61 AU, 1.0 AU, 1.8 AU, 3.4 AU, 6.6 AU and 13 AU. The innermost will be in the life zone, the second in the middle zone, the third on the border between middle and outer zones, and the rest will be in the outer zone.

STEP 8: FILL PLANETARY ORBITS

Each orbit placed in Step 7 will be occupied by some object, unless it falls in a forbidden zone as the result of the presence of a companion star. In this step, we will place objects in three classes.

A *gas giant* is a massive planet, composed mostly of hydrogen and helium. Because of a gas giant's powerful gravity, it is likely to have many moons and will affect the formation of other planets in nearby orbits. Gas giants are most likely to form outside the snow line of a system, but can appear in the inner system as well. Examples in the Terran system include Jupiter, Saturn, Uranus, and Neptune.

A *terrestrial planet* is a small, stony body with little or no atmosphere. Terrestrial planets are most likely to be found in the inner system, inside the snow line. They are unlikely to have many moons, or large ones. Examples in the Terran system are Mercury, Venus, Terra, and Mars.

A *planetoid belt* is an orbital region occupied by many very small, stony objects. None of the planetoids are more than a few hundred miles in diameter, and most of them are much smaller. Planetoids are the remains of stillborn planets, remnants from the formation of the star system. Planetoid belts are normally formed when a gas giant or companion star disturbs the early mass of planetoids, pulling them out of the stable orbits that would have allowed them to coalesce into a planet. The few planetoids that survive this winnowing process make up a stable system. The Terran system has one major planetoid belt.

Every star system has a great deal of debris in it: scattered planetoids outside the main belts, comets and tiny rogue planets in the dark outer fringes. We will not generate these objects in detail (but see the sidebar).

Procedure

Begin by placing gas giants in their orbits. For each available orbit, roll 3d against the appropriate target number from the Gas Giant Placement Table. If the roll succeeds, a gas giant will occupy the orbit.



Gas Giant Placement Table

Orbit Zone	Target Number
Inner zone	3 or less
Life zone	4 or less
Middle zone	7 or less
Outer zone	14 or less

Next, place planetoid belts. Any orbit not already occupied by a gas giant may contain a planetoid belt. If the next orbit out from the primary star already contains a gas giant, there will be a planetoid belt on a roll of 15 or less on 3d. If there is a companion star, the outermost orbit before the forbidden zone will be occupied by a planetoid belt on a roll of 12 or less on 3d. An orbit not meeting either of these conditions will contain a planetoid belt on a roll of 6 or less on 3d.

Any orbit not occupied by either a gas giant or a planetoid belt will contain a terrestrial planet.

You may already have information about the "mainworld" of the system, as when developing system information based on published *Traveller* material. An inhabited "asteroid belt" can be placed in any slot occupied by a planetoid belt. A world with an Earthlike atmosphere must be placed in the life zone. If a gas giant is already in the life zone, the Earthlike world can still be placed, as a moon of the gas giant. If the life zone is occupied by a planetoid belt, it should be removed and replaced with the Earthlike world.

Example

Referring to the Gas Giant Placement Table, the GM decides to work from the innermost orbit outward, and rolls 3d three times. He gets 12, 11 and 14. There will be no gas giants in the system. When placing planetoid belts, he again works from the star outward, rolling 4, 9 and 13. There will be one planetoid belt, in the innermost orbit. The other two orbits will be occupied by terrestrial planets. The planet at 0.58 AU appears to be a good candidate for Earthlike conditions.

STEP 9: PLANET SIZE

In this step, we will determine the diameter, density, mass and surface gravity of the planets in the star system under development.

Diameter

For each planet, roll 2d. Modifiers: -4 for the innermost orbit, -2 for any other orbit inside the snow line, +6 for the first orbit outside the snow line, and +4 for the second orbit outside the snow line. -1 for a main sequence star of type M0 through M4, -2 for a main sequence star of type M5 through M8. Multiply the result by 1,000 miles (for a terrestrial planet) or 5,000 miles (for a gas giant) to get the diameter of the planet. For a terrestrial planet the minimum diameter is 1,000 miles, for a gas giant it is 25,000 miles.

The GM may wish to vary these diameters slightly. If so, roll 2d-7 and multiply by 100 miles (for a terrestrial planet) or 500 miles (for a gas giant). Add the result to the diameter obtained above to get a more precise value.

Density

A planet's density depends on its diameter and composition, but the details of computing it are too complex for gaming purposes. As a rule of thumb, terrestrial planets will be denser if they are larger, since rock compresses slightly under gravity. They will also be denser if they are *younger*, since later generations of stars formed in nebulae that were enriched in heavy elements. Gas giants will also be denser if they are larger, but they vary less in composition. We can get reasonable values as follows.

Terrestrial planets: Roll 3d. Modifier: -1 for every full 500 million years of the star system's age (the final result can be negative). Divide the result by 10, retaining fractions, and add the appropriate value from the Terrestrial Planet Density Table. The minimum possible result is 1.3. The result is the planet's average density in grams per cubic centimeter (divide by 5.5 to get density relative to that of Earth).

Terrestrial Planet Density Table

Diameter	Inside Snow Line	Outside Snow Line
<3,000 miles	3.2	2.3
3,000 - 5,999 miles	4.4	1.6
6,000 - 8,999 miles	5.3	1.8
≥ 9,000 miles	5.9	1.9

Terrestrial planets can be classified by their density, as in *GURPS Space*. A planet with density of 1.3 to 3.0 is a *silicate* world, with density 3.1 to 4.5 it is a *low-iron* world, with density 4.6 to 6.0 it is a *medium-iron* world, with density 6.1 to 7.0 it is a *high-iron* world, and with density 7.1 and up it is a *metallic* world.

"Hot Jupiters"

Science fiction games often include systems for star system generation, based on the current wisdom among astronomers. For a long time, this has meant a "default model" for planetary systems: small rocky planets close to the star, gas giants out in the cold fringes, all of the planets following fairly circular orbits.

Recently, astronomers have developed the first indirect methods for detecting Jupiter-sized planets around other stars. Very few of these planets have been seen directly, but in each case the planet's presence affects the movement of its primary star. Very precise instruments can measure these effects, allowing us to estimate the mass and orbital characteristics of each planet. Planets orbiting other Sunlike stars were first discovered in 1995, and by this writing there are about twice as many planets known outside the Solar system as inside!

To the astronomical community's surprise, very few of the new planets have followed the expected pattern. Many of them circle surprisingly close to their primary stars, well inside the life zone. Also, many of the new planets follow eccentric orbits, unlike any major planet in the Solar system.

At this writing, theory is scrambling to explain these strange findings. The most popular hypothesis is that a Jupiter-sized planet in the process of formation tends to lose angular momentum through interaction with surrounding matter. It therefore spirals inward quickly, until something aborts the process or it is absorbed by the primary star. This theory is promising, but it fails to explain how Jupiter and the other gas giants of our own Solar system survived.

One implication is that Earthlike planets may be fairly rare in the Galaxy. A Jupiter-sized planet orbiting close to its primary would tend to disrupt the formation of terrestrial planets in the life zone. Even worse, a gas giant in the process of spiraling into its primary might simply *destroy* any planets forming closer in. At present there is no way to even guess the likelihood of such events.

Of course, the detection methods that enable us to locate these planets are biased. These strange cases are much more likely to be detected than a "normal" distant gas giant. The team which has found the most of these extrasolar planets has estimated that perhaps one or two percent of Sunlike stars have close-in gas giants. For the moment, it remains possible to believe in a Galaxy with many Earthlike worlds, a congenial setting for space opera roleplaying.

Space Junk

A normal solar system will contain many minor objects that don't fit the scheme we use here. These objects may be important in a *Traveller* campaign.

Not every star system will have planetoid "belts" as such. On the other hand, almost every star system will contain planetoids that wander freely, taking up whatever stable orbits are available. In our own Solar system, there are thousands of planetoids outside the "main belt" between the orbits of Mars and Jupiter.

One important group of planetoids will be associated with the gas giant planets. There are two positions on the orbital path of a gas giant around its primary, sixty degrees (or one-sixth of the circle) ahead and behind. These "Trojan points" are dynamically stable, due to the combined gravitation of the gas giant and its primary star. Planetoids which drift into these positions will tend to stay near them for long periods. This might make a gas giant's Trojan points a convenient place for space industries or refueling stations.

Comets will also appear in almost every star system. Comets are planetoid-sized objects, composed mostly of ices rather than stone. Comets might make a good source of water for space habitats or for starship refueling.

Most of a system's comets exist in the "Oort cloud," a region stretching thousands of AU away from the primary star in all directions. There are *trillions* of comets in the Oort cloud, but they are so widely scattered that finding even one would be a difficult task. A more useful group may exist in a system's "Kuiper belt," which lies in the star system's plane at about the outer limit distance. Some comets fall into the inner star system due to random perturbations, and become the spectacular, regularly appearing objects we're familiar with.

Along with the comets, any star system may have some number of icy bodies, the size of large moons, at or beyond the outer limit distance of the system. Pluto and its moon Charon are examples of this class of object in the Terran system. These might present another opportunity for refueling, for a starship that is out of other options.

The presence of all these objects means that very few star systems will be *completely* without hydrogen-bearing volatiles. Even if there is no gas giant present and the main world of the system is a desert, local civilization can always snag a comet and have enough water to refuel armadas of starships. Or a lone starship, stranded, can search for an ice-bearing object in the outer fringes of the system.

Note that this procedure yields a fairly limited range of densities for a terrestrial planet of a given size. The occasional world may be considerably heavier or lighter, indicating that strange events occurred during planetary formation. Perhaps chemical fractionation somehow took place in the protoplanetary cloud, leading to an unusually light world. Or perhaps a monstrous collision occurred, leaving only an iron-rich core behind. In any case, the GM should (as always) feel free to exercise creativity rather than relying on a roll of the dice.

If the GM wishes to fix a world's density based on its diameter and a desired value for surface gravity, he should use the following:

$$K = (43.9 \times G) / D$$

Here, **K** is the density of the world in grams per cubic centimeter, **G** is the desired value for surface gravity, and **D** is the world's diameter in thousands of miles. Once this formula is applied, the world's mass and surface gravity will work out to be approximately correct.

Gas Giants: Simply refer to the Gas Giant Density Table to get a value for the average density of the planet in grams per cubic centimeter.



Gas Giant Density Table

Diameter	Density
<40,000 miles	1.4
40,000 - 59,999 miles	1.0
60,000 - 79,999 miles	0.7
80,000 - 84,999 miles	1.0
≥85,000 miles	1.4

Mass

Once a world's diameter and density are known, we can compute its mass and surface gravity. To get a world's mass, use the following:

$$M = (K \times D^3) / 2750$$

M is the world's mass in units of Earth's mass. **K** is the world's density in grams per cubic centimeter, as computed above. **D** is the world's diameter in thousands of miles.

Surface Gravity

To compute a world's surface gravity, use either of the following (they give roughly equivalent results):

$$G = (62.9 \times M) / (D^2)$$

$$G = 0.0228 \times K \times D$$

G is the world's surface gravity in units of Earth's surface gravity (Gs). **K** is the world's density in grams per cubic centimeter, **M** is the world's mass in Earth masses, and **D** is the world's diameter in thousands of miles.

Example

The terrestrial planet in the Haven system's second orbit looks like the best candidate for an Earthlike world. The GM names that planet "Haven" and decides to detail it before fleshing out any details for the rest of the system. The second orbit is inside the snow line but it isn't the innermost in the system, so he rolls 2d-2 for a 6. This would yield a diameter of 6,000 miles, which the GM decides to vary. He rolls 2d-7 for a 3, yielding a final diameter of 6,300 miles.

For density the roll is 3d-8. The result is a 0, so the planet's density is 5.3 grams per cubic centimeter. This makes Haven a medium-iron world with density about 96% that of Earth. The planet's mass is 0.48 Earth masses and its surface gravity is 0.76 G.

"One of the first things they teach you in training is that no matter how strange it seems, somebody has probably seen it before. They tell you that everything has been seen, labeled, cross-indexed and classified a thousand times over. This is merely to lull you into a false sense of security."

*– Twenty Years in the ISS,
Janos Projaska*

STEP 10: PLACE MOONS

For our purposes, we will classify satellites as *small moons* and *large moons*. Small moons are planetoid-sized, no more than 100 miles in diameter. Large moons, on the other hand, may be up to 5,000 miles in diameter. The orbital distances of moons will be given in *planetary radii*. For example, the surface of the planet is at one planetary radius from its center (by definition). A satellite at two planetary radii is twice as far from the center of the planet, a satellite at ten planetary radii is ten times as far, and so on. Planetary radii can be converted to miles by multiplying by half the planet's diameter.

Terrestrial planets and gas giants can each have satellites, but the two classes are very different in the *kind* of moons they are likely to have.

The moons of a terrestrial planet must orbit close in, since the planet's mass is low and would have difficulty maintaining its gravitational hold on a distant satellite. This is especially true for planets that are close to the overwhelming gravitational pull of the primary star.

For terrestrial planets, large moons are an exception. They form close to the planet, but they don't remain there, as tidal effects quickly force them out to a wider orbit. For example, current theory claims that Terra's large moon formed at about 4 planetary radii, but only a million years later had moved halfway out to its current orbit at 60 planetary radii. This partially explains why terrestrial planets are very unlikely to have more than one large moon. With orbits changing so quickly, it's very difficult for multiple large moons to fall into a stable configuration. Instead, they will tend to collide with each other or with the planet.

Gas giants, on the other hand, have extensive systems of satellites. A gas giant's powerful gravity allows it to compete more effectively with its primary star, especially since it probably orbits further out in any case.

One feature which is probably unique to gas giants is the *ring system*. Almost all gas giants have rings, composed of billions of small particles orbiting in a flat disc at about 2 planetary radii. The rings are composed of particles thrown off the gas giant's inner moons due to meteoroid collisions. A large number of inner moons means more particles feeding the ring. It also increases the chance that some of the moons will be in position to act as "shepherds," maintaining the ring particles in their orbits. Normally a gas giant's rings are fairly thin and wispy, but a few ring systems may be as spectacular as Saturn's, in the Terran system.

Science fiction has sometimes used the notion of an Earthlike world with a ring system. In fact, the Third Imperium includes such a world in the Spinward Marches sector (Trin). This situation may be unlikely, but it's not impossible. A moon might spiral too close to the planet and shatter, or a major impact on a moon might scatter enough debris to form a ring. The problem is that such a system would be unstable. The particles would fall to the planet or escape to space, within a few million years at most. These rules don't not allow the random generation of terrestrial planets with rings, but the GM is free to set up such a system as a rare case.

Wayward Planets

The main text rules should suffice for generating stable, long-lived systems of planets. It's possible, however, for any given star system to capture free-wandering planets from outside. It seems unlikely that such a wayward planet would remain in place for very long. It would occupy an unusual orbit at first, highly eccentric or inclined to the plane that the other planets orbit in. In the long term, gravitational perturbations from other planets in the system would tend to regularize its orbit, or eject it to interstellar space once again. Large gas giants are particularly effective in "policing" a star system. The presence of Jupiter may be one reason why Sol system has no wayward planets.

To determine if any wayward planets are present, roll 3d. Modifiers: +2 if any gas giants are present in the system. On a 7 or less there will be 1d-3 wayward planets (minimum 1). For simplicity, assume that any wayward planets orbit the primary star in a multiple star system.

Wayward planets may appear in almost any part of a star system, including outside the outer limit distance. To determine the orbital parameters of a wayward planet, roll on the Orbital Separation Table and Orbital Eccentricity Table as if generating parameters for a companion star. Determine the planet's minimum and maximum separation from its primary as usual, then check to see that the planet does not cross into any forbidden zones. If it does, then the planet's orbit is unstable and must be re-generated.

We have no information on what kind of "rogue" planets exist in interstellar space, or even if they exist at all. Assume that any wayward planet is a terrestrial world without moons. Determine its properties normally using the rules in the main text. Note that a captured planet is almost certainly not the same age as the rest of the star system, and can be much older or younger. The GM should determine an age for the planet using any convenient means. In Chapter 5, determining a planet type (see Step 12) will be difficult if a wayward planet's orbit crosses between orbital zones. The GM should set a planet type based on his own common sense and the needs of his campaign.

Incidentally, the capture of wayward planets is one of the few ways that a very early type star (O or B type) might have a planetary system. A *Traveller* GM should feel free to use such a situation if it fits his campaign.

Planetoid Belts

A planetoid “belt” is actually an orbital zone, in which many small chunks of stone or ice circle their primary star. Planetoid belts often possess valuable resources, and can be inhabited “worlds” in their own right.

Planetoids tend to be stony objects, but they can vary dramatically in the details of their composition. *S-type* planetoids have plenty of metal-rich silicates containing iron, magnesium or nickel. *M-type* planetoids are even richer in metals, and may be mostly composed of metallic nickel-iron. *C-type* planetoids are poor in metals, but contain carbon and may also contain volatiles such as water ice. *P-type* planetoids also have carbon and volatiles, and may have complex organic compounds on their surfaces. Any planetoid belt can be mined for metals. Even more to the point, a civilization living in the belt can mine the volatiles-carrying planetoids for organics and water, the basis of any deep-space habitat environment.

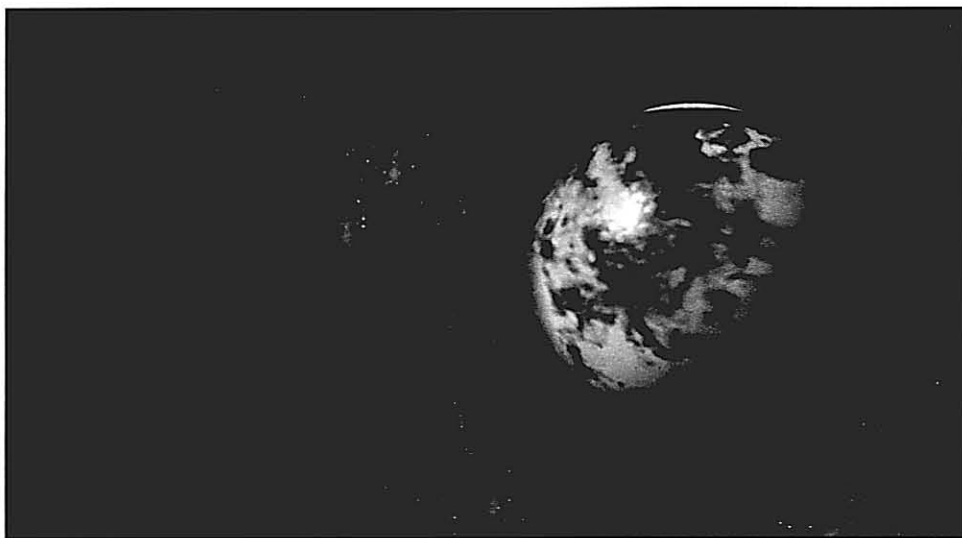
If a planetoid belt is to be developed as a world, ignore most of the world-design sequence. Most of the planetoids in the belt will have nearly circular orbits, with radius close to the radius assigned to the belt. Oddly enough, some planetoids have “moons” in orbit around them, but these are too small and close to be generated using the rules in the main text. The rotation period of any given planetoid can be generated using the main text rules. Planetoids are almost always of the Tiny size class, and will be of Rockball or Icy Rockball type depending on their location in the star system.

Planetoid belts can vary dramatically in economic value. When determining the Resource Value of a planetoid belt, roll 3d on the following table. Modifiers: -3 in the inner zone, -1 in the life zone, -3 in the outer zone.

Planetoid Belt Value Table

Roll (3d)	Overall Value	Modifier
3	Worthless	-5
4	Very Poor	-4
5	Poor	-3
6-7	Very Scant	-2
8-9	Scant	-1
10-11	Average	+0
12-13	Abundant	+1
14-15	Very Abundant	+2
16	Rich	+3
17	Very Rich	+4
18	Motherlode	+5

Continued on next page . . .



Procedure

Terrestrial planets: Roll 1d-4 to determine the number of large moons for a terrestrial planet. If the planet has *no* large moons, it will have 1d-2 small moons. Modifiers (for both of these rolls): -3 for a planet within 0.75 AU of the primary star, -1 for a planet between 0.75 AU and 1.5 AU away from the primary star, +1 if the planet is more than 9,000 miles in diameter, -1 if the planet is between 2,000 and 3,999 miles in diameter, -2 if it is less than 2,000 miles in diameter. Do not roll for moons for a planet within 0.5 AU of its primary star.

A terrestrial planet's small moons orbit close to the planet, between 2 and 7 planetary radii. Roll 1d+1 for each small moon to determine this value. If two moons orbit at the same radius, re-roll for both.

Large moons will be found between 10 and 80 planetary radii. Before determining the orbital radius of a large moon, determine its size as described below. Then roll 2d. Modifiers: +1 if the moon is 500-999 miles in diameter, +2 if it is 1,000-1,999 miles in diameter, +3 if it is 2,000-3,999 miles in diameter, +4 if it is 4,000 miles or more in diameter. Multiply the result by 5 to get the radius of the moon's orbit in planetary radii. Large moons of terrestrial planets *may not* orbit close to each other. If two orbits are within 10 planetary radii of each other, re-roll or assign new values.

Gas giants: The satellite systems of gas giants are always very complex. We will simplify and assume that gas giants normally have three distinct families of moons.

The first family is a cluster of small moons orbiting at between 2 and 5 planetary radii. These moons orbit very close together, sometimes even sharing orbits in a “resonant” pattern that prevents their collision. Roll 2d to determine the number of small moons in this family. Record their number, but don't bother to generate specific orbital information or sizes for them until one of them becomes important to an adventure.

The size of this family will also determine the level of ring system the planet has. If a gas giant planet has at least 6 moons in this family, its ring system will be visible from anywhere in the star system, at least in moderately powerful telescopes. If there are 10 or more moons in this family, the ring system will be comparable to Saturn's, easily visible in even small telescopes from a distance of several AU.

The second family is a group of large moons, orbiting between 6 and 30 planetary radii. Roll 1d to determine the number of moons in this family. Modifiers: -5 for a planet within 0.5 AU of the primary star, -3 for a planet

within 0.75 AU, -1 for a planet within 1.5 AU. Roll 3d+3 to determine the orbital radius of each moon. If any result is 15 or more, add another roll of 2d. If any two orbits are within 2 planetary radii of each other, re-roll or assign new values.

The last family is a group of small moons, orbiting at 40 to several hundred planetary radii. These moons are normally captured planetoids, and often have highly eccentric, inclined or even retrograde orbits. Roll 1d to determine the number of these moons. Modifiers: -5 for a planet within 0.5 AU of the primary star, -3 for a planet within 0.75 AU, -1 for a planet within 1.5 AU, +4 if there is a planetoid belt within 3 AU. Again, don't bother to generate specific information for these moons.

Moon Size

To determine the diameter of a small moon, roll 2d-5. If the result is greater than 0, it will give a diameter in tens of miles. If the result is 0 or less, assign the moon a diameter less than 10 miles. A very small moon is likely to be irregular (the moon's self-gravitation isn't strong enough to force a spherical shape).

To determine the diameter of a large moon, roll 2d-7 and add a modifier from the Large Moon Size Table.

Large Moon Size Table

Planet Diameter	Modifier
60,000 miles or more	+2
40,000-59,999 miles	+1
8,000-9,999 miles	-1
6,000-7,999 miles	-2
4,000-5,999 miles	-3
2,000-3,999 miles	-4
Less than 2,000 miles	-5

If the result is greater than 0, it will give a diameter in thousands of miles. The GM may vary the diameter by up to 500 miles, using the same procedure as for planetary diameters. If the result is 0 or less, assign the moon a diameter between 100 and 500 miles. This procedure sometimes generates moons for gas giants that are larger than theory considers likely, but big (and habitable!) gas giant moons have made good adventure sites in science fiction too often for us to rule out the possibility here.

If a terrestrial planet is going to be developed in full detail, the GM should determine the density and mass for at least the planet's large moons. This can be done using the same procedures as in Step 9. No other properties of a moon will have significant effect on the planet, so they can be left ungenerated unless the moon itself is going to be an adventure location.

Example

Haven orbits at 0.58 AU and is between 4,000 miles and 9,000 miles in diameter. The modified roll for large moons is 1d-7, so the GM doesn't bother rolling. Haven has no large moons. The modified roll for small moons is 1d-5. The GM rolls and gets a result of 1, so Haven will beat the odds and have one small moon. He rolls 1d+1 and gets a 7, so the moon will orbit at 7 planetary radii. For diameter, the GM rolls 2d-5 and gets a 1, so the small moon will be about 10 miles in diameter. Since the moon is small, the GM decides not to determine its density and mass for now.

Planetoid Belts

[Continued]

Poor belts either contain relatively few objects, or contain few of the metal-bearing or volatiles-bearing objects that are of use. A "worthless" belt contains nothing but a scattering of stony gravel, impossible to mine or live in. On the other hand, a rich belt contains many metallic or volatiles-bearing objects, spaced relatively close together for ease of use.

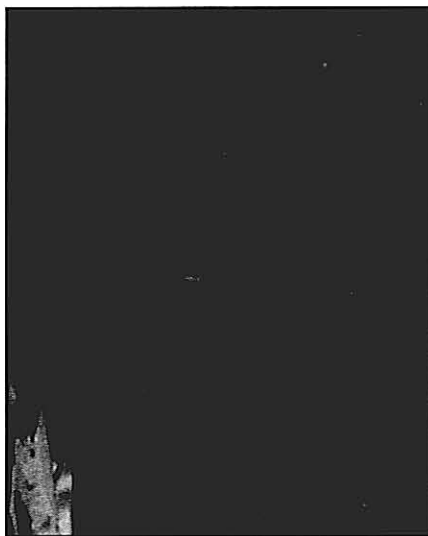
When developing the population and local tech level of a planetoid belt in Chapter 6, treat it as if it were a planet with diameter less than 4,000 miles, with no atmosphere or hydrographic coverage. Its MSPR will be 0, but it may have a PR of up to 10 like any other world.

Rhylanor (II)

The GM is now ready to place planets in the Rhylanor system. He has already established that Rhylanor itself occupies the innermost orbit, at 0.21 AU. Published material claims that the system contains no gas giants. This is unlikely under the current rules, since there are several orbits outside the snow line. Nevertheless, the GM skips over gas giant placement and goes on to place planetoid belts. Without gas giants, there is no obvious place to put the one planetoid belt listed in canon material, so the GM arbitrarily chooses the orbit at 3.4 AU. The other five orbits all contain terrestrial planets, which the GM will develop later if he needs to.

It's finally time to develop Rhylanor, the mainworld of the system, in detail. Referring to *Behind the Claw*, the GM finds that Rhylanor's diameter is (rounded to three significant figures) 3,980 miles. This is about Mars-sized, a trifle small for a world that has seas and an oxygen-nitrogen atmosphere (even if that atmosphere is listed as being Very Thin). The GM therefore decides to make the planet's density higher than average for its size and age. The usual roll for density would be 3d-6 with an average of 4.5, yielding a density of about 4.9 grams per cubic centimeter. The GM chooses a density of 5.5 grams per cubic centimeter instead, making Rhylanor about as dense as Terra despite its small size. He decides that its nickel-iron core is unusually large, and its overall metal content high. The chosen density yields a planetary mass of 0.126 Earth masses, and a surface gravity of almost exactly 0.5 G.

Rhylanor is so close to its primary star that it will not have moons on a random roll. The GM decides not to place any arbitrarily, and moves on to the next step.



Worlds

Tide-Locked Worlds

Many habitable worlds are tide-locked. One situation is the habitable moon of a gas giant planet, which will almost certainly be tide-locked to the planet. "Double planets," where a terrestrial planet and its moon are of comparable size, may lead to the two worlds being locked to each other. Another case is that of a planet in the life zone of a small type-M star. Since such stars are very common, explorers will often encounter such worlds in the course of their travels.

When a planet is tide-locked with respect to its primary star, the situation has a number of implications. There will probably not be much axial tilt. The "day face" will be unusually warm. The "night face" may be warmed by air circulation, but this process will be inefficient and most of the face will be very cold. If a tide-locked world doesn't retain enough atmosphere, air circulation will fail, and *all* of the planet's volatiles will freeze out on the night face.

Step 11: Apply a -10 modifier to the roll on the Axial Tilt Table. Tide-locked worlds will not rotate in the retrograde direction.

Step 12: When determining world type, compute the size parameter as usual, then divide it by 2. The world will (effectively) be of the size class indicated by the reduced size parameter. A world which becomes of Desert or Rockball type due to this process will have extensive caps of frozen volatiles on its night face.

Step 13: If the world is still of a type that has a substantial atmosphere after the correction to Step 12 is applied, then compute its atmospheric pressure as usual.

Step 14: When rolling to determine hydrographic coverage for the planet, apply a -4 modifier. Any oceans will tend to be in or near the "twilight zone" between the day and night faces.

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We will sometimes use the generic term *world* to refer to any astronomical body that characters are likely to visit. This can be a planet, a moon, or even a single planetoid. This chapter includes rules and guidelines for developing single worlds as sites for adventure.

PHYSICAL DETAILS

In this section, we'll detail the physical characteristics of our world.

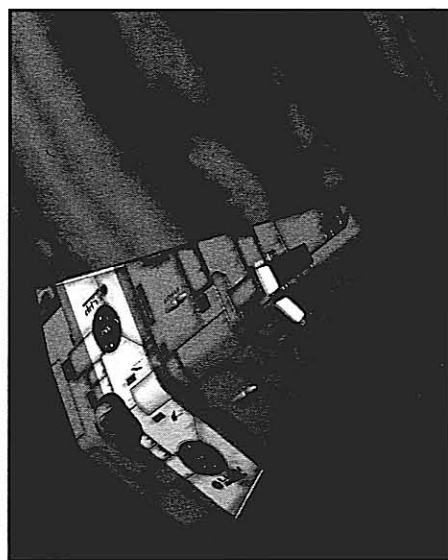
STEP 11: DYNAMIC PARAMETERS

Most planetary orbits are eccentric, but they don't deviate as far from a circular path as the orbits of stars in a multiple system. Highly eccentric orbits are not stable. Any planet in such an orbit will tend to fall into the primary star or be ejected from the system in a relatively short time.

In this step, we will compute the orbital and rotational periods for the planet and any of its moons. In effect, this will give us the length of the local "day," "month," and "year."

Orbital Eccentricity

Roll 3d on the Planetary Orbit Eccentricity Table and record the resulting value.



Planetary Orbit Eccentricity Table

Roll (3d)	Eccentricity
3-4	0.00
5-6	0.01
7-8	0.02
9-12	0.05
13-14	0.08
15	0.10
16	0.15
17	0.20
18	0.25 or more (assign value)

The minimum and maximum separation between the planet and its primary can be computed as for stars:

$$\text{Minimum separation} = (1 - E) \times R$$

$$\text{Maximum separation} = (1 + E) \times R$$

E is the eccentricity of the planet's orbit, and *R* is the orbital radius (which can be considered the *average* separation). It's possible for eccentric planetary orbits to overlap. If this happens, assume that the orbits are in sufficiently different planes so that the two planets never come dangerously close to one another.

Orbital Period

The orbital period of a planet is computed as follows.

$$P = \text{Square root of } (R^3 / M)$$

P is the orbital period in standard years, **R** is the orbital radius in AU, and **M** is the mass of the primary star in solar units. Multiply **P** by 365.26 to get the period in standard days.

The orbital period of a moon can be computed using a similar formula.

$$P = 0.0074 \times \text{Square root of } (R^3 / M)$$

Here, **P** is the orbital period in standard days, **R** is the orbital radius in thousands of miles, and **M** is the *sum* of the masses of the planet and moon. As a rule of thumb, the moon's mass can be ignored if its diameter is no more than 1/5 that of the planet.

Astronomers should notice that the orbital periods computed above are *side-real* periods. They measure the time it takes for the planet or moon to complete one orbit with respect to distant stars. The apparent length of a month or day on the planet itself is affected by the planet's rotation (see below).

Tidal Effects

A planet orbiting its primary star will not experience that star's gravity uniformly. The star will exert more gravitational force on the near side of the planet than on the far side. Likewise, if the planet has a moon, that moon will also exert a differential force on the near and far sides of the planet. This difference causes something called a *tidal force*. It tends to pull the planet into a slightly elongated shape, producing tidal bulges on the near and far sides. These bulges will be much more noticeable in liquids than in more-rigid rock, causing high and low ocean tides as the planet rotates.

The level of tidal force exerted on the planet has another effect, over long periods of time. If the planet rotates with respect to the body producing a tidal force, the tide will slow that rotation. In extreme cases, the planet may *stop* rotating altogether with respect to the other body, becoming "tide-locked" so that the tidal bulges remain stationary. We will estimate the level of tidal force on any given planet, to get an idea how significant any ocean tides may be, and also to help determine the planet's rotation period.

To estimate the level of tidal force being exerted on a planet by each of its moons, use the following.

$$T = (0.14 \times M \times D) / R^3$$

T is a measure of the tidal force on the planet, in units of the force exerted by Earth's Moon on the Earth. **M** is the mass of the moon in Earth masses, **D** is the diameter of the planet in thousands of miles, and **R** is the radius of the moon's orbit around the planet in *millions* of miles. A planet also exerts tidal forces on its moons. Use the same formula to estimate the strength of these forces, using **M** for the planet's mass and **D** for the moon's diameter.

Tide-Locked Worlds

[Continued]

Step 17: When computing the average surface temperature, multiply the final result by 1.2. The corrected result will be the average surface temperature *on the day face*.

Some tide-locked worlds will exhibit "resonant tide-locking." If a planet's orbit has eccentricity of at least 0.15, then it's possible for the planet to settle into a stable situation such that its rotational period is exactly 2/3 of its orbital period. Since such a world rotates (slowly) with respect to its star, it should be designed using the standard rules. The GM may use this situation instead of full tide-locking whenever it seems appropriate.



Rhylanor (III)

At this point, the GM takes stock. Without proceeding further, it's obvious that strictly following the world-design sequence will make it very difficult to generate a Rhylanor that matches published material. The planet orbits very close to its red-dwarf star, and will almost certainly be tide-locked to it. This would not be a problem for a larger world, but the rules for tide-locked worlds imply that Rhylanor is too small to retain any atmosphere at all, much less an almost-breathable one (not to mention oceans).

Continued on next page . . .

Rhylanor (III)

[Continued]

Meanwhile, even if the tide-locking were not a factor, the planet is too small to be an Ocean world. It will be classified as a Desert world at best, meaning that while the seas may not be impossible, they do stretch the bounds of probability. Clearly the world-design rules will have to be bent. The trick will be to bend them as little and as few times as possible.

Bearing all this in mind, the GM proceeds to develop Rhylanor's dynamic parameters. He considers setting the orbit's eccentricity at 0.15 or higher, allowing him to use resonant tide-locking, but he decides against it — he doesn't want to use that trick too often. A roll on the Planetary Orbit Eccentricity Table yields a minimal eccentricity of 0.05. The planet approaches its primary as closely as 0.20 AU, and recedes as far as 0.22 AU. The orbital period is almost exactly 0.15 standard years, or 54.9 standard days.

Rhylanor's primary star exerts a tidal force of close to 10 on the planet, implying a total tidal effect of about 240. The GM decides not to roll randomly for rotation period, knowing that that roll would automatically make the planet tide-locked. Instead, he observes that if he made the roll, it would yield an initial rotation period of about 260 hours, which is close to 1/5 of the orbital period. He decides that Rhylanor is currently in a state where it rotates exactly five times per orbit. Such a state isn't stable in the long term, but the GM finds it plausible that it could last for a few million years. Besides, it makes an interesting local detail. So the rotation period is exactly 10.98 standard days. The GM rolls for retrograde rotation and gets a 15, so Rhylanor rotates retrograde. The apparent day length is 9.15 standard days, and the star appears to rise in the west and set in the east.

Finally, a random roll on the Axial Tilt Table yields an axial tilt of 15 degrees.

The primary star also exerts tidal forces on its planets. To estimate these, use the following.

$$T = (0.057 \times M \times D) / R^3$$

T is again a measure of the tidal force on the planet, in the same units as above. Here, however, **M** is the mass of the primary star in solar units, **D** is the planet's diameter in thousands of miles, and **R** is the planet's orbital radius in AU.

One important factor is the *total tidal effect* on the world.

$$E = (S \times A) / M$$

E is a measure of the total tidal effect, essentially a "fudge factor" for the amount by which the world's rotation has been slowed by the various tidal forces on it. **S** is the sum of all tidal forces on the world, from the primary star or any moons, as computed above. **A** is the star system's age in billions of years, and **M** is the mass of the world in Earth masses. Round **E** to the nearest whole number.

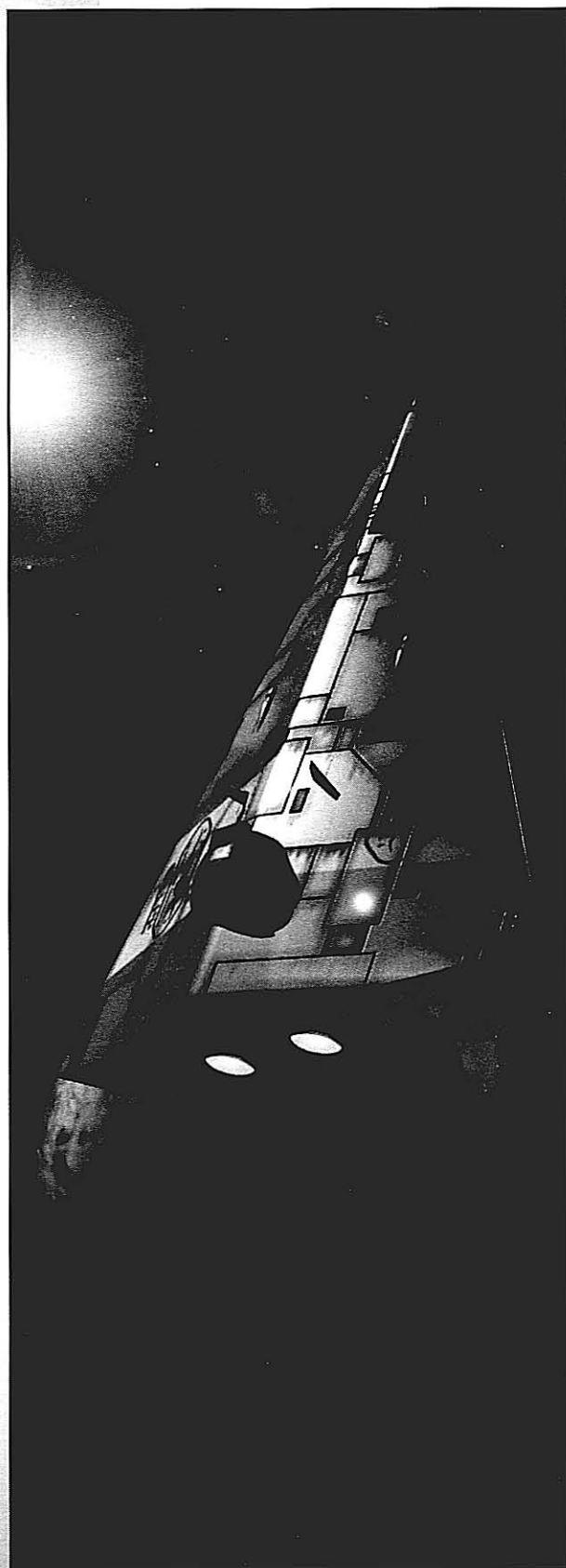
Rotation Period

In general, more massive worlds tend to rotate more quickly, but this is modified by many factors and can depend on sheer accident during the formation of the star system. A nearly random choice of rotation period is as likely to be realistic as any other method.

Roll 3d. Modifiers: Add the total tidal effect, along with the appropriate modifier from the Rotation Period Table. The result is an initial value for the planet's rotation period in standard hours (divide by 24 to get standard days).

Rotation Period Table

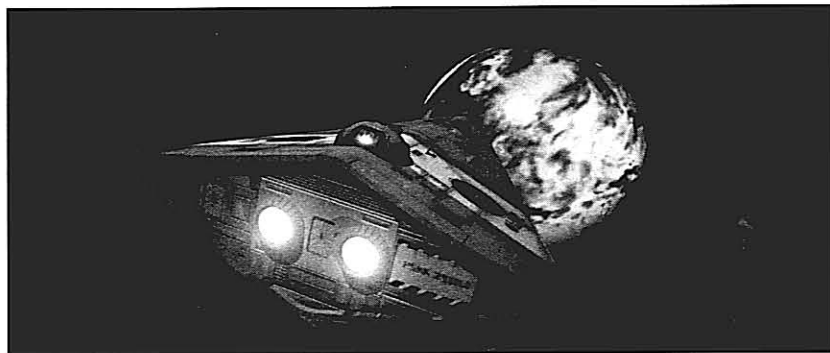
Diameter	Modifier
Less than 3,000 miles	+10
3,000-5,999 miles	+8
6,000-8,999 miles	+6
9,000-25,000 miles	+4
25,000-39,999 miles	+3
40,000-59,999 miles	+2
60,000-79,999 miles	+1
80,000-84,999 miles	+0
More than 85,000 miles	-1



If the result is greater than 36 hours *or* the initial 3d roll was a natural 16 or greater, the planet will have unusually slow rotation. In this case, roll 3d on the Special Rotation Table and use the result from that instead. Modifiers: +1 for every hour that the initial rotation period value was over 36 hours.

Special Rotation Table

Roll (3d)	Rotation Period
6 or less	Use initial value for period
7	1d × 2 standard days
8	1d × 5 standard days
9	1d × 10 standard days
10	1d × 20 standard days
11	1d × 40 standard days
12	1d × 100 standard days
13 or more	Tide-locked



The Special Rotation Table can yield a result of *tide-locked*, indicating that the planet's rotation has stopped with respect to some body exerting tidal forces on it. Also, if the rotation period from the above procedure is longer than the orbital period of the planet's innermost moon or the orbital period of the planet itself, the planet is tide-locked instead. Tide locking has a variety of implications (see sidebar).

If the world is not being acted upon by any significant tidal forces, then tide-locking will not take place. If the total tidal effect is less than 1 but a result of "tide-locked" appears anyway, assume the world's rotation period is 1d × 200 standard days.

The GM may treat the value for rotation period from the tables as approximate, and arbitrarily vary it by part of standard hour, a few standard hours, or a few standard days as appropriate. Rotation periods can also be recorded with precision down to the minute or second, although this is useful mostly for local color.

Again, the rotation period generated here is the sidereal period, the time it takes the planet to complete one rotation with respect to a distant fixed point. The apparent local day length may be different (see below).

By convention, each star system has a "north" direction, defined so that the star rotates eastward (in accordance with the right-hand rule). On each planet, "north" and "east" are also defined by the right-hand rule in accordance with planetary rotation, but in some cases the planet's north pole is actually on the "south" side of its orbital plane with respect to the primary star. In effect, the planet rotates in the opposite direction from the primary star and most of its neighboring planets. This is more common than one might assume. In the Terran system, two out of the eight major planets have such "retrograde" rotation. For each planet, roll 3d. The planet will have retrograde rotation on a 13 or more.

Local Calendar

At this point, the GM can determine the length of various celestial cycles from the point of view of an observer on the planet's surface. The formula to be used for all of these computations is:

$$A = (S \times R) / (S - R)$$

A is the apparent length of the cycle, S is the sidereal period associated with the cycle in question, and R is the rotation period of the planet. All of these must be expressed in the same units. If the planet rotates retrograde, R is *negative*. If S and R are equal, the above formula is undefined. In this case, assume that the length of the cycle is *infinite*, or that there is no apparent motion.

Detailed World Typing

To get greater accuracy in world typing, we need to correct the size parameter for a given world to account for the amount of energy it receives from its primary star. If a world is closer to its primary, it is warmer and the molecules in its upper atmosphere are more likely to attain escape velocity.

Compute a correction factor as follows:

$$C = \text{Square root of } R / \text{Fourth root of } L$$

Here, C is the correction factor, R is the average distance of the world from the primary star, and L is the star's luminosity. Multiply the size parameter as computed in the main rules by this correction factor, and use the result as the corrected size parameter. Close to the inner edge of the life zone, the correction factor will be about 1 – this is why the uncorrected size parameter is usually close enough in such cases.

For those interested in the science behind these formulae: the corrected size parameter is inversely proportional to the minimum molecular weight of substances that the world can retain over a long period of time. Divide 6.93 by the corrected size parameter, and round the result up to the nearest whole number. Substances with at least this molecular weight will be retained, while lighter substances will tend to escape quickly. For comparison, some of the more important molecular weights are: hydrogen 2, helium 4, methane 16, ammonia 17, water vapor 18, nitrogen 28, oxygen 32.

Local Color

It might be interesting to determine the size of various objects in a world's sky. Use the following formula:

$$S = (57.3 \times D) / R$$

S is the apparent size of the object, in degrees. **D** is the object's diameter, and **R** is the distance to the object (both in the same units). This is a reasonable approximation for apparent sizes up to about 20 degrees. For comparison, from Earth's surface both the Sun and the Moon appear to be about half a degree across, roughly the size of a US dime held six feet from the eye.

The apparent size of an object has several effects. For example, the smaller a star's apparent size in the sky, the sharper the shadows it will throw. For example, an early F-class star will appear very small as seen from a world in its life zone, so its shadows will be sharp and very black. A small red dwarf, on the other hand, will loom very large over a world in its life zone. Shadows there will be blurred and the surroundings will appear to have "indirect" lighting. Also, if a planet's moons appear at least as large as its primary star, then total solar eclipses will be possible.

A star's spectral type will also affect the quality of light more directly. Early A-type or F-type stars will put out harsh white light. Cool M-class dwarf stars will emit softer light. Incidentally, a red dwarf's light will not look obviously "red" from the surface of its planets. It will have a color balance more like that of an incandescent bulb – different from Earthly sunlight, to be sure, but not so much so that the human eye can't adapt. A more radical difference is due to the fact that an M-class star emits most of its radiation in the infrared. The actual amount of visible light reaching a planet in a red dwarf's life zone will be only a few percent of that reaching Earth. The human eye will be able to adapt to this as well, seeing about as well as it does on a cloudy day on Earth. It will be possible to stare directly at the star's disk, picking out starspots and other features (although this will be dangerous, because the high level of IR radiation may cause retinal burns).



The day length (the time between sunrises) is computed by setting **S** equal to the planet's orbital period. For a rapidly rotating planet, the day length will be very close to the actual rotation period for the planet. If day length is *negative*, as often happens when the planet is in retrograde rotation, the primary star will appear to rise in the west and set in the east.

The apparent length of a moon's orbital cycle (the time between moonrises) is computed by setting **S** equal to the moon's sidereal orbital period, as computed above. If the length of the cycle is *negative*, as often happens for very close-in moons, the moon will appear to rise in the west and set in the east. A close-in moon may happen to orbit near the planet's geosynchronous distance, in which case the moon will spend long periods in the sky as seen from any given location, keeping pace with the planet's surface.

Axial Tilt

The angle between a world's rotation axis and a vector perpendicular to the star system's ecliptic plane is what we call the *axial tilt* of the world. The major planets of the Terran system have a wide variety of axial tilt values, and there seems to be no correlation with their other properties.

Roll 3d on the Axial Tilt Table. If necessary, roll 1d on the extended table. In any case, roll 2d as indicated and record the end result.

Axial Tilt Table

Roll (3d)	Axial Tilt
2 or less	0 degrees
3-6	0 + (2d-2) degrees
7-8	10 + (2d-2) degrees
9-10	20 + (2d-2) degrees
11-12	30 + (2d-2) degrees
13-14	40 + (2d-2) degrees
15-18	Roll on extended table

Roll (1d)	Axial Tilt
1-2	50 + (2d-2) degrees
3-4	60 + (2d-2) degrees
5	70 + (2d-2) degrees
6	80 + (2d-2) degrees

Example

The GM now proceeds to determine the orbital and rotational parameters for the planet Haven. He rolls 3d on the Planetary Orbit Eccentricity Table and gets a 6 yielding a minimal eccentricity of 0.01. Haven's minimum separation from

its primary star is 0.57 AU, and its maximum separation is 0.59 AU. Haven's orbital period is 0.51 standard years, or 186.3 standard days.

Based on the results from step 10, Haven's moon orbits very close in, about 22,000 miles from the center of the planet. Its orbital period is 1.10 standard days. The tidal force of the primary star on Haven is 1.38, somewhat greater than the Moon's tidal force on the Earth. The total tidal effect on Haven is 12.

The GM rolls 3d+18 (+6 for the planet's size and +12 for the total tidal effect) and gets a total rotational period of 28 hours. He decides to vary this a bit and records the actual period as 27 hours, 50 minutes (about 1.16 standard

days). The apparent day length is almost exactly 28 hours. The moon's apparent orbital period is -21.27 standard days. Haven's moon rises in the west and sets in the east, and appears to move much more slowly than Haven's sun. It spends several local days in the sky at any one time. Finally, the GM rolls on the Axial Tilt Table, getting a 7 on 3d and a 9 on 2d. Haven's axis is tilted by about 19 degrees.

STEP 12: WORLD TYPE

Gas giant planets are all very similar. When you know a gas giant's mass and diameter, you know almost everything you need about it. Terrestrial planets, on the other hand, are much more diverse. The following steps are appropriate for terrestrial planets and moons, especially those in the life zone.

A world's general type depends on what *volatiles* the planet's core can retain over billions of years. Volatiles are chemical compounds with low melting and boiling points, which make up the bulk of a planet's atmosphere. Over billions of years, heavy volatiles will be retained by a world while lighter compounds escape into space. We will use world types to *vastly* simplify the world-building process.

Procedure

In general, larger worlds can retain lighter volatiles. The closer a world is to its primary, however, the faster the loss of volatiles will take place and the more likely it is that light volatiles will escape. Here, we will present a relatively simple approach to determining what volatiles will be retained by a world over the long term. These simple rules will be nearly correct for worlds in a star's life zone, less so elsewhere. See the sidebar for a more detailed and realistic procedure, applicable to worlds anywhere in a star system.

Begin by computing the *size parameter* as follows:

$$P = (7.93 \times M) / D$$

Here, **P** is the size parameter, **M** is the world's mass in Earth-masses, and **D** is the world's diameter in thousands of miles. Round the size parameter off to the nearest hundredth, then refer to the World Size Table.

World Size Table

Size Parameter	Size Class	Typical Diameters
More than 1.74	Large	More than 10,400 miles
0.39-1.73	Standard	4,900-10,400 miles
0.25-0.38	Small	3,900-4,900 miles
0.14-0.24	Very Small	3,000-3,900 miles
Less than 0.13	Tiny	Less than 3,000 miles

Here, the *size class* is defined by what major volatiles will be retained. The "typical diameters" column shows what size worlds will fall into each size class, assuming densities equal to that of Earth. Denser worlds will tend to rise into higher size classes, less dense worlds will fall into lower ones.

A *large* world is one which can retain hydrogen and helium over long periods of time. Such a world will tend to have a thick atmosphere composed mostly of hydrogen compounds. A *standard* world is too small to retain hydrogen, but it can retain water vapor in its atmosphere over long periods. If the world's surface temperature is right, it will have liquid-water oceans on its surface, and has a good chance of being close to Earthlike conditions. A *small* world cannot retain water vapor in its atmosphere. Such worlds tend to be dry, although if they are cold enough they may have large deposits of water ice. They may retain substantial atmospheres of nitrogen and nitrogen compounds, and can also retain

Terraforming

The world-design rules in the main text make a number of unspoken assumptions. One of the most important of these is that worlds evolve *naturally*, with no interference from any advanced civilization. This is a poor assumption to make for any space-opera setting!

Terraforming is the art of modifying planetary environments. Every industrial civilization engages in it, although not always with full knowledge of what it is doing. It's possible that our own civilization is altering Earth's climate, by burning fossil fuels and releasing greenhouse gases into the atmosphere. So far the evidence isn't conclusive – but if we hadn't learned a great deal about planetary climate by exploring the other worlds of the Solar system, we wouldn't even be aware of the possibility.

By TL9, it becomes possible to make *deliberate*, large-scale changes to a planet in the life zone. The climate category can be adjusted by one or two levels, depending on the situation. Any Ocean world can be moved to the Earthlike world type if isn't already there, using genetically engineered organisms to build a new ecosystem. A Desert world might even be turned into an Earthlike world, using water and air mined from comets. Such changes might take many centuries to complete (less at higher TL). They are also temporary, in the sense that many of them would reverse themselves once the terraforming civilization stopped maintaining them. Of course, in this case "temporary" means that the natural state would return in thousands or even *millions* of years. A planet which was once terraformed, but is now inhabited by a culture which doesn't have the technology or the wealth to maintain the changes, would make an interesting "dying world" setting.

In the Third Imperium setting, it's clear that many worlds have been terraformed. The Imperium itself sponsors some ongoing terraforming projects, and many worlds have been made human-habitable by previous civilizations. The Ancients clearly modified many worlds, using technology capable of making permanent and radical changes to planetary environment.

Local Biochemistry

Science fiction has often included worlds where the local life forms are incompatible with human needs. Humans may simply get no nutritional value out of local life forms (and vice versa). Or the local flora and fauna can actually set off allergic or toxic reactions in humans who are exposed to them. Certainly there's no reason why alien life-forms have to use the same biochemistry we do. For that matter, even the amino acids that form the basis for Terran biochemistry come in "left-handed" and "right-handed" forms. All Terran life uses the left-handed forms, but a different evolutionary path might use the right-handed forms – leading to two virtually identical biochemistries that could not use each other's proteins.

If the GM wishes to include this factor in worldbuilding, he can roll 3d on the Compatibility Table.

Compatibility Table

Roll (3d)	Level
3-6	Nearly Identical
7-8	Compatible
9-13	Partially Compatible
14-15	Incompatible
16-18	Toxic

Nearly Identical indicates that the two biochemistries are very close. Humans have no problem living off native foods, and native life can eat Terran organisms. In fact, this level might be a drawback because local diseases can "cross over" to Terran organisms fairly easily.

Compatible means that humans can satisfy their dietary needs locally, although it helps if they can supplement their diet with Terran foods. Diseases are not likely to cross over.

Partially Compatible means that humans can eat some native foods, possibly after considerable effort in processing or cooking them. They can't rely wholly on native foods without developing various deficiency diseases. Diseases will not cross over, although the local equivalent of decay bacteria can still deal with dead Terran organisms.

Incompatible means that humans will not be able to get any nutritional value out of local life forms, no matter how much processing is done. Diseases will not cross over, and decay organisms may have difficulty with dead Terran organisms.

Toxic means that humans will find local life forms to be poisonous. Exposure to local proteins will set off allergic reactions. Disease and decay organisms will be unable to attack Terran life. In extreme cases, this situation can be the equivalent of a Polluted atmosphere.

oxygen (although without photosynthetic life there will be very little "free" oxygen in the atmosphere). A *very small* world cannot even retain molecular nitrogen in its atmosphere. There are heavier volatile compounds, but most of them are either chemically unstable or involve relatively rare elements, and so they can't form a substantial atmosphere. Very small worlds tend to not only be dry, but to have very thin atmospheres. Finally, a *tiny* world cannot retain even the heaviest common volatiles, and will have only a trace atmosphere if it has any at all.

Once the size class of a world has been established, cross-reference it with the orbital zone the world falls in on the World Type Table.

World Type Table

Size Class	Inner Zone	Life Zone	Middle Zone	Outer Zone
Large	Hostile (SG)	Hostile (SG)	Hostile (SG)*	Hostile (SG)*
Standard	Greenhouse	Ocean*	Hostile (N)*	Hostile (A)*
Small	Desert	Desert*	Desert*	Hostile (A)*
Very Small	Rockball	Rockball	Rockball	Icy Rockball
Tiny	Rockball	Rockball	Rockball	Icy Rockball

The table gives world types following the system in *GURPS Space* (p. S105), with extra detail in some cases. An asterisk indicates that the world is likely to have substantial oceans of some liquid substance (see Step 14).

A result of *Hostile (SG)* indicates that the world is a *subgiant*. A subgiant world is large or cold enough to retain hydrogen in its atmosphere, yet never experienced the runaway accretion process that would have given rise to a gas giant. A subgiant world has a dense atmosphere of hydrogen and hydrogen compounds such as methane or ammonia. Unlike a gas giant, the atmosphere is relatively shallow, and the world has a well-defined surface of rock and ice. A gas subgiant close enough to its primary star may support life. There are no examples of such a world in the Terran system.

Hostile (N) indicates a *nitrogen world*. Molecular nitrogen is a very common atmosphere component for hostile worlds, because it is relatively heavy, has a low freezing point, and is very chemically stable. Many Hostile worlds will therefore have atmospheres dominated by nitrogen. In the Terran system, Saturn's moon Titan is an example of such a world. Terra itself was a nitrogen world early in its history, before the advent of photosynthetic life.

Some nitrogen worlds will have methane and ammonia in their atmospheres, making them a variant of an *ammonia world* (see below). Roll 3d. Modifiers: -3 if the primary star is of type A, -1 if it is of type F, +1 if it is of type K, +3 if it is of type M, +1 if the world is in the outer half of the middle zone. On a 15 or more the world is actually of type *Hostile (A)*.

A result of *Hostile (A)* indicates an *ammonia world*, whose atmosphere contains substantial amounts of ammonia, methane, and other compounds. Ammonia and its related volatiles are even more likely than water to photodissociate when exposed to ultraviolet light, so an ammonia world's primary star must be either of a late spectral type or fairly distant. If an ammonia world is warm enough, it may have oceans of liquid water and ammonia in a so-called "eutectic" mixture. Such a world may support life. There are no clear examples of such a world in the Terran system, although Saturn's moon Titan comes close. Its atmosphere is composed mostly of nitrogen, but it contains significant amounts of methane and other exotic compounds.

A *Greenhouse* world retains a substantial atmosphere, originally including water vapor. However, it is too close to its sun to maintain habitable conditions. Early in its history, its liquid-water oceans boil, putting large amounts of water vapor in the atmosphere and setting off an intense greenhouse effect. As a result,

the world's water vapor is exposed to a process of *photodissociation*. That is, ultraviolet light from the primary star breaks water down into hydrogen and oxygen, after which the hydrogen is lost to space and the oxygen combines with other elements. Meanwhile, the intense heat "bakes" the world's surface rock, bringing large quantities of carbon dioxide into the atmosphere and making the greenhouse effect self-sustaining. The result is a dense, dry, furnace-hot atmosphere composed of carbon dioxide and sulfur compounds, utterly inhospitable to organic life. An example in the Terran system is Venus.

A few Greenhouse worlds close to the life zone may have different properties. For example, if photodissociation works fast enough, the world's supply of water may be lost before the greenhouse effect becomes self-sustaining. The planet would then cool off, remaining in a reasonable temperature range and retaining a dry atmosphere of nitrogen compounds. Such a world would be of type *Desert* (see below). Assume that this situation can appear if the world's orbital radius is at least 90% that of the inner edge of the life zone. Roll 3d. Modifiers: +3 if the primary star is of type A, +1 if it is of type F, -1 if it is of type K, and -3 if it is of type M. On a 15 or more, the world is of type Desert rather than Greenhouse.

A result of *Ocean* indicates that the world is a good candidate for Earthlike conditions. It has a substantial atmosphere and extensive liquid-water oceans. The exact world type depends on the presence of life, which we will determine in Step 15.

A *Desert* world is too small to retain water vapor in its atmosphere. Thus any surface water that exists early in their history either freezes or is lost to space. Most desert worlds have some volcanic activity early on, but cool off and become geologically dead within a billion years or so. Their atmospheres tend to be thin, composed primarily of carbon dioxide and nitrogen. An example in the Terran system is Mars, although Mars is so small as to almost be a *rockball* world (see below).

A *Rockball* world is too small to retain most volatiles. Rockball worlds have no more than a trace atmosphere, and little or no ice. They may exhibit some volcanic activity early in their existence, but they rapidly cool off and become geologically dead. Examples in the Terran system include Mercury and Luna.

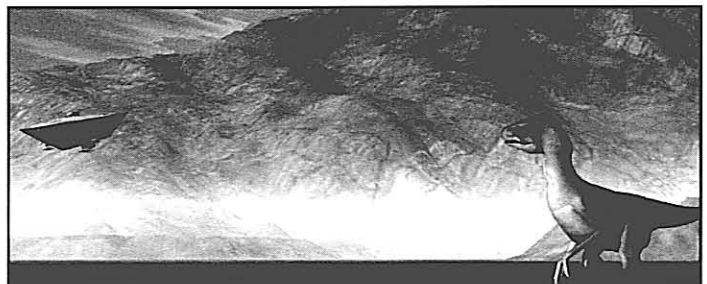
An *Icy Rockball* world is normally too small to retain gaseous volatiles, but cold enough to keep frozen volatiles. Ice worlds have very little atmosphere, but are partially or completely covered with a coat of ice. Water and carbon dioxide ices form close to the primary star, while in the outer reaches of the system there may be plentiful ammonia, methane or nitrogen ice. Examples in the Terran system include Jupiter's moon Callisto or Neptune's moon Triton.

Icy Rockball worlds orbiting gas giants will be heated by tidal effects. Such moons may have extensive liquid-water oceans beneath their surface of ice. They are common places for refueling stations, since the hidden water can be brought to the surface relatively easily. An example in the Terran system is Jupiter's moon Europa. Meanwhile, a few gas giant moons are heated enough to become "sulfur worlds." The tidal heat drives off all of the ices and light volatiles, leaving only the heavy sulfur compounds. A sulfur world is mostly composed of normal rock, but it has extensive volcanic activity which concentrates sulfur compounds on the surface. An example in the Terran system is Jupiter's moon Io. Roll 3d for any ice world orbiting a gas giant within 10 planetary radii. On a 10-13 the moon has subsurface liquid-water oceans. On a 14+ the moon has very little ice but has sulfur volcanoes.

Atmospheric Pollutants

Here are some of the most likely contaminants to be found in a Polluted atmosphere. See *GURPS Space* for more details on the effects of these.

Chlorine or Fluorine: In an oxygen-nitrogen atmosphere, chlorine would normally combine with other elements to form nontoxic compounds. It's possible for living things with an odd biochemistry to release a significant amount of chlorine into the atmosphere, however. This might give rise to a biosphere full of plants and animals which use an Earthlike carbon-oxygen cycle, but which are well-adapted to trace amounts of chlorine in the air. Visitors who do not have similar biochemistries would find the unfiltered air to be corrosive and very poisonous. Since chlorine gas is heavier than air, it would tend to pool in caves and depressions in the land, reaching concentrations that might kill even native animal life. Rainfall and standing "water" would actually be a weak hydrochloric acid solution on such a world. Fluorine could conceivably play a role similar to chlorine, but it is much less common.



Sulfur Compounds: Hydrogen sulfide and various sulfur oxides might be a byproduct of massive industrial pollution or heavy volcanic activity. Visitors would find the unfiltered air to be toxic and full of unpleasant odors. Sulfur compounds would also make rainfall and standing water slightly acidic.

Nitrogen Compounds: Certain nitrogen compounds may be in the atmosphere due to industrial pollution (they will not co-exist with an oxygen-nitrogen atmosphere under natural circumstances). As with sulfur compounds, the unfiltered air would be toxic and any open water would be made slightly acidic.

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Atmospheric Pollutants

[Continued]

Low Oxygen: The atmosphere might have no significantly toxic elements, and still be hard to breathe due to a relative lack of oxygen. Moderate examples would cause visitors to tire easily and have difficulty with strenuous activities. In more extreme cases, a visitor without his own oxygen supply would simply suffocate. Fortunately, a compressor mask or portable oxygen tank is enough to avoid these effects. At the GM's option, visitors may be able to acclimate themselves to this condition.



Pollutants: The atmosphere may be breathable as far as its gas mix is concerned, yet still have some contaminant in it that makes it dangerous. Examples include pollen, spores, disease microorganisms, complex airborne toxins released by certain plants, airborne dust from industrial or volcanic pollution, or radioactive contamination from nuclear incidents. A filter mask may be enough to avoid the harmful effects of these. The GM must decide the likely effects of exposure, and how easily visitors can acclimate to the local conditions. Some pollutants may have very subtle long-range effects. Others may kill quickly – but only when local conditions concentrate them in the atmosphere. Either case can lead to sudden nasty surprises for explorers...

Continued on next page...

Example

The GM now proceeds to Step 12, determining Haven's world type. Haven has mass of 0.48 Earth masses and a diameter of 6,300 miles, so its size parameter is about 0.6. Since the planet is in the life zone and the size parameter isn't on a borderline, the GM doesn't bother correcting for the amount of energy received from Haven's sun. The planet is clearly of Standard size. Since it is in the life zone, it will be an Ocean world, its exact world type to be determined later.

STEP 13: ATMOSPHERE PRESSURE

The physics of planetary atmospheres are terribly complex, and we will only approximate them here. First, we determine the atmospheric pressure at a standard elevation. On worlds with liquid oceans, the usual standard elevation is sea level. Without oceans, planetologists define a *datum level* at some convenient elevation, normally near the average elevation of the planet's entire surface. We will describe atmospheric pressures as in *GURPS Space* (see p. S108).

Procedure

If a world's size class is Tiny, it will have no significant atmosphere. If the size class is Very Small, then the world will have no more than a *trace* atmosphere. A Greenhouse world will have a *superdense* atmosphere.

For all other worlds, roll 3d, multiply by 0.1, then multiply the result by the planet's surface gravity. The result is the base

atmospheric pressure, relative to that of Earth's atmosphere at sea level.

Atmospheres are classified as *very thin* (below 0.5 Earth normal), *thin* (0.5 to 0.8 Earth normal), *standard* (0.8 to 1.2 Earth normal), *dense* (1.2 to 1.5 Earth normal), or *very dense* (above 1.5 Earth normal).

Traveller Note: The world-design system in the original *Traveller* rules did take into account that the density of a world's atmosphere is tied to its size. The implied relationship wasn't as strong as theory requires, however, so the system often generated tiny planets with dense atmospheres (or large planets with only a trace of atmosphere). Feel free to place a world with an unexpectedly thin or dense atmosphere, but be aware that this is an unusual circumstance and may require explanation if you are concerned with scientific realism. For consistency, a world's type may have to be redefined as if it were of a larger or smaller Size Class (i.e., a Standard size world with no atmosphere should be re-classified as Tiny for this purpose, making its world type Rockball or Icy Rockball).

Example

The GM is now ready to determine the properties of Haven's atmosphere, hydrosphere, and biosphere (if any). He begins by rolling 3d for a 9, multiplying by 0.1 and by Haven's surface gravity of 0.76. Haven's surface atmospheric pressure will be 0.68 atmospheres, giving it a Thin atmosphere.

STEP 14: HYDROGRAPHICS

Some worlds will have extensive oceans of some liquid substance. Close to the primary star, this liquid will usually be water, possibly with other chemicals or impurities in it. Further out, the oceans may be composed of liquid ammonia or more exotic substances.

Procedure

A world may have hydrographic coverage if it is of Large, Standard or Small size class, has at least a Very Thin atmosphere, does not fall in the inner zone, and is closer to its primary star than three times the snow line distance. To determine the percentage of the surface covered by liquid, roll 2d-2. Modifiers: +2 if the primary star is of type M, +1 if it is of type K, -1 if it is of type F, -2 if it is of type A, -8 if the world is a Desert world in the life zone, -6 if it is a Desert world in the middle zone, -2 if it is a Hostile world of any subtype. The result cannot be less than 0 or greater than 10. Multiply the result by 10% to determine the ocean coverage of the world. The GM may vary this percentage by up to 5% at his discretion.

Example

Turning to Haven's hydrographics, the GM rolls 2d-2. He gets a 7 and concludes that the planet has about 70% ocean coverage. He decides to vary this a little and sets the exact hydrographic coverage at 73%.

STEP 15: NATIVE ECOSPHERE

Simple one-celled lifeforms may be very common in the universe, but only certain world types are likely to give rise to complex ecospheres and intelligence. The level of complexity of the local ecosphere is dependent on time and random chance.

Procedure

If a world has hydrographic coverage, or is an Icy Rockball with subsurface liquid oceans, then it may have native life. Roll 2d on the Native Ecosphere Table and record the result. Modifiers: +2 for an Ocean world, add +1 for every 500 million years of the star system's age.

Native Ecosphere Table

Roll (2d)	Ecosphere
13 or less	No Life
14-16	Protozoa
17	Metazoa
18	Simple animals
19 or more	Complex animals

At this point, the exact world type of an Ocean world can be determined. If the world has metazoa, simple animals, or complex animals, then it is *Earthlike*. Otherwise, it is of type *Hostile (N)*.

Note that this procedure only determines the level of *native* life. A starfaring civilization which colonizes new worlds will bring along its own plant and animal life. If the native ecosphere has advanced no further than "simple animals," the newcomers may well crowd out the native life.

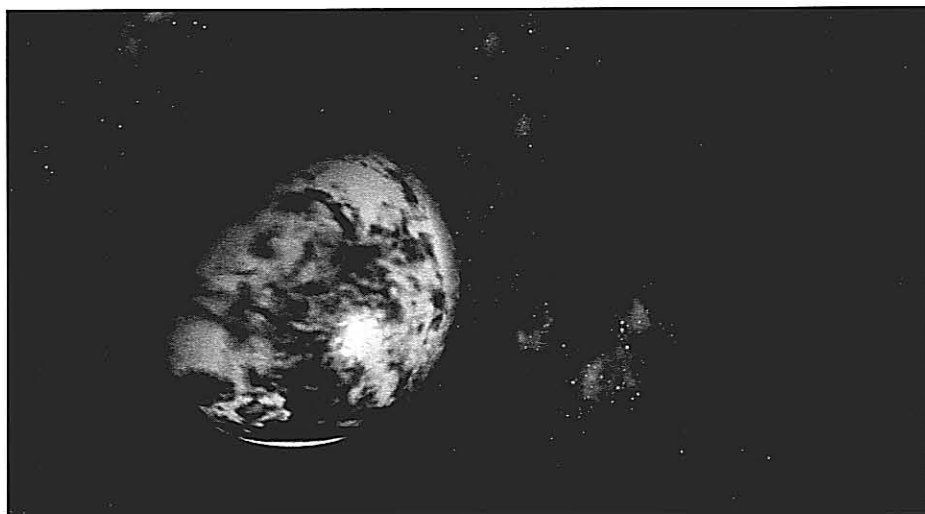
Atmospheric Pollutants

[Continued]

High Carbon Dioxide: The human metabolism is set to deal with a certain concentration of carbon dioxide in the air. When there is too much, our breathing reflex malfunctions and we tend to hyperventilate and experience a sense of suffocation. This effect can be dealt with as long as sufficient oxygen is present, and visitors may be able to acclimate themselves. Very high levels of carbon dioxide are actually toxic, and cannot be adapted to.

High Oxygen: In moderate cases, an excess of oxygen can be a mild irritant to skin and mucous membranes, and can make it much easier for visitors to hyperventilate when working hard. This can be handled using some kind of reducing respirator, preferably covering the face to avoid irritation of the eyes and air passages. In high concentrations, oxygen can be actively poisonous.

Inert Gases: Nitrogen and other chemically inert compounds can cause "inert gas narcosis" when their partial pressure is high enough. Symptoms include light-headedness, reduced dexterity, euphoria and impaired judgement. This is normally only a problem in very dense atmospheres, although a new compounds (nitrous oxide or "laughing gas" in particular) can cause these symptoms at relatively low pressures.





Weather

Weather systems (storms and high winds) are driven by a difference in temperature or pressure in adjacent portions of a planet's atmosphere. Where the potential for greater differences exists, the weather can be more violent. We will define the *weather factor* for a world as a simple indicator of how violent and changeable local weather is likely to be there.

Vacuum worlds have no weather (obviously). If the world has at least a Very Thin atmosphere, roll 1d+7. Modifiers: +4 if the world's rotation period is less than 8 hours, +3 if between 8 and 12 hours, +2 if between 12 and 16 hours, +1 if between 16 and 20 hours, -1 if between 32 and 40 hours, -2 if between 40 and 56 hours, -3 if between 56 and 72 hours, -4 if greater than 72 hours. +4 if the axial tilt is greater than 45 degrees, +2 if it is between 30 and 44 degrees, +1 if it is between 20 and 29 degrees, -1 if it is 10 degrees or less. +4 if the world's base climate is Very Hot or Torrid, +3 if it is Hot, +2 if it is Tropical, +1 if it is Warm, -1 if it is Chilly, -2 if it is Cold, -3 if it is Very Cold, -4 if it is Frozen or Frigid. +6 if the world's atmosphere is Very Dense, +2 if it is Dense, -1 if it is Thin, -3 if it is Very Thin. The result (which may be negative) is the weather factor. For comparison, the weather factor of Terra is 10.

Ecosphere Levels

Protozoa are single-celled life forms. Almost all protozoa live as individuals, surviving by exploiting chemical reactions in their environment. Some species cluster together, forming bacterial "mats" that may cover large stretches of shallow water. Protozoa include bacteria, algae, and simple fungi.

Metazoa are multi-celled organisms, composed of cells which have learned the trick of living in symbiotic communities. Metazoa include simple plant and animal forms: lichens, molds, kelp, sponges and jellyfish.

Simple animals have developed differentiated internal structures (bones, muscles, nerves). Terran examples include arthropods, fish and amphibians. Such animals are supported by an array of plant forms, using photosynthesis on Eden worlds, more exotic chemical reactions elsewhere. They may attain IQ scores up to about 3.

Complex animals have developed even further physically, and have added a variety of complex behavior patterns. Terran examples include reptiles, birds, and mammals. Complex animals may develop sentience. Roll 3d to determine how sentient the most advanced animals on the planet are. On a 15 or less, all animals are nonsentient (IQ 5 or less, up to the level of wolves or big cats). On a 16 or 17, near-sentient animals exist (IQ 6-7, equivalent to a chimpanzee, hominid or cetacean). On an 18, native sentience has appeared (IQ 8+).

Traveller Note: The procedure here allows for the possibility of native sentient life, but such life will be rare. This is realistic, since the available evidence seems to indicate that sentient life is an unusual phenomenon. In a fictional setting where there are many starfaring races, however, the GM may want sentient life to be more common. He should feel free to arbitrarily place a sentient species on any life-bearing world, if it fits his campaign plan.

Alternatively, the GM may apply a consistent positive modifier to the roll for determining the highest intelligence on any world bearing complex animals. A modifier of +1 or +2 would be reasonable. In fact, a +2 probably approximates the frequency of sentient life in the Third Imperium setting. Note that in the Third Imperium, even worlds that have no native sentient species may be the homeworld of a minor human race.

Example

Since Haven is an Ocean world which is 4 billion years old, the GM rolls 2d+10 on the Native Ecosphere Table and gets a 20. Haven has an advanced ecosphere, including complex animals, so it is automatically an Earthlike world. The GM rolls 3d again, adding 2 since he's working in the Third Imperium setting. He gets a 16, and records that there is near-sentient animal life in Haven. Since he doesn't care whether a sentient species is present on Haven or not, he accepts this result.

STEP 16: ATMOSPHERE COMPOSITION

If a world has only a trace or no atmosphere, then its composition is irrelevant. Thicker atmospheres can vary dramatically in their properties, especially their ability to support life. There are four types of atmosphere (these definitions follow p. S108).

Oxygen-Nitrogen: Such an atmosphere is similar to Earth's, breathable for human beings. It is composed primarily of oxygen and nitrogen, with no contaminants sufficient to cause breathing problems. Such an atmosphere requires the presence of life or of strange chemical processes, since free oxygen tends to disappear from the atmosphere (combining with other elements in the atmosphere or in surface rocks) unless replenished.

Polluted: Polluted atmospheres are basically oxygen-nitrogen, but human beings require some degree of artificial help to breathe them. This may indicate a simple problem with the balance of atmospheric gases, or the presence of contaminants (see sidebar).

Exotic: Exotic atmospheres are unbreathable, and cannot easily be made breathable by filtering or processing. Human beings will require a self-contained oxygen supply and possibly protective clothing to survive in an exotic atmosphere. Even without protection, however, a human could survive exposure to an exotic atmosphere for a few minutes.

Corrosive: Corrosive atmospheres are very deadly to human beings, forcing them to use extensive artificial means for survival. Unprotected humans exposed to a corrosive atmosphere will die quickly and painfully.

Procedure

The basic atmosphere type depends on the planet type as determined in Steps 12 and 15.

A world of types Hostile (SG) or Hostile (A) will have an atmosphere composed of compounds which are highly poisonous to human life. Such an atmosphere is always Corrosive.

A world of types Hostile (N) or Desert will have an atmosphere composed mostly of nitrogen, with small amounts of carbon oxides, nitrogen oxides, argon or sulfur compounds. The proportions of each depend on the available volatiles and on the surface temperature. Such an atmosphere will normally be Exotic, but roll 3d. On a 13 or more the quantity of nitrogen or sulfur compounds is high enough to make the atmosphere Corrosive.

A Greenhouse world has an atmosphere composed of carbon oxides and sulfur compounds, at very high temperature and pressure. Such an atmosphere is always Corrosive. Note that *GURPS Space* allowed for the appearance of "earthlike" Greenhouse worlds. These rules assume that such worlds fall under the Earthlike category, so that all Greenhouse worlds are intensely hostile.

An Earthlike world will (by definition) have an atmosphere composed primarily of oxygen and nitrogen. Such an atmosphere will normally be Oxygen-Nitrogen, but roll 3d. On a 12 or more some atmospheric component will be outside the range of human tolerance, making the atmosphere Polluted. For a Polluted atmosphere, roll 3d on the Atmospheric Contaminants Table or choose a primary contaminant from the sidebar.

Atmospheric Contaminants Table

Roll (3d)	Major Toxic Factor
3-4	Chlorine/Fluorine
5-6	Sulfur Compounds
7-8	Nitrogen Compounds
9-10	Low Oxygen
11-12	Pollutants
13-14	High Carbon Dioxide
15-16	High Oxygen
17-18	Inert Gases

Traveller Note: In the original *Traveller* system, planetary atmospheres were rather more likely to be Oxygen-Nitrogen than is indicated here. In particular, it was possible to get a breathable atmosphere on a world with no oceans, or with no advanced life. As always, when placing a world the GM is free to adapt these rules to yield the situation he wants. In this case, the occurrence of prior terraforming may be enough to explain many otherwise-hostile worlds with Earthlike atmospheres.



Gaming Weather

On any world that has a weather factor, the GM can use it to generate local weather as adventurers go about their business.

While adventurers are exploring a planetary surface, check for weather every eight hours. Roll 3d. Modifiers: subtract the planet's weather factor, and apply any modifier based on the last eight-hour period's weather. The GM should also feel free to modify this result to account for local conditions. The final result may be zero or negative. Check the result against the Weather Table.

Weather Table

Roll (3d)	Weather
3 or more	Calm
0 to 2	Windy
-3 to -1	Storm
-6 to -4	Severe Storm
-7 or less	Violent Storm

Calm: There is no appreciable wind. There may be some cloud cover, depending on local climate (moist climates almost always have some cloud cover, dry climates are often very clear). Visibility is good, unless local conditions are likely to cause fog or haze.

Windy: Fairly strong winds are blowing. Depending on local climate, this may lead to sandstorms, a snow white-out, or high waves on bodies of water. Visibility is somewhat reduced. Suggested vehicle control penalties are -1 or -2 for water or air vehicles.

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Wind Conditions: Hazardous
(Sandstorm Class 3)

Vel: 80
187 Degrees Magnetic
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Gaming Weather

[Continued]

Storm: If the local climate allows it precipitation is falling (rain or snow). Visibility is poor. Suggested vehicle control penalties are -1 or -2 for all vehicles. Subtract 1 from the next weather roll.

Severe Storm: Strong winds and rapid precipitation, possibly with frequent lightning. Visibility is very bad. Suggested vehicle control penalties are -1 or -2 for ground vehicles, -3 or -4 for water or air vehicles. Subtract 2 from the next weather roll.

Violent Storm: Very strong winds will destroy flimsy structures and damage exposed vegetation. People or animals caught in the open must make rolls against Dexterity or an appropriate skill to avoid injury. Precipitation is violent and may include hail or driving rain. Visibility is almost zero. Suggested vehicle control penalties are -3 or -4 for ground vehicles, -5 or -6 for water or air vehicles. Subtract 4 from the next weather roll.

Notice that some worlds may have a weather factor as high as 31. Such worlds will be in an almost constant state of violent weather, to the extent that any native life will have to have made very unusual adaptations just to survive. On the other hand, some worlds may have a weather factor as low as -4. These worlds will *never* have violent weather unless the GM deliberately decides to inflict some on the explorers.

Example

Since Haven is Earthlike, it has an oxygen-nitrogen atmosphere which humans may be able to breathe. The GM rolls 3d for 14, yielding a Polluted atmosphere. He decides to choose a contaminant randomly and rolls 3d, getting a 12. Haven's atmosphere has generic pollutants in it. The GM improvises and decides that a common form of plant life fills the air with spores and pollen that attack the human respiratory system.

STEP 17: OVERALL CLIMATE

We now determine the average surface temperature of the planet. Greenhouse worlds are a special case here. Don't bother to determine a specific surface temperature for any greenhouse world (it will be far above the habitable range in any case).

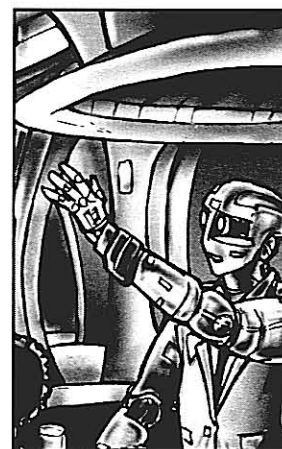
Albedo

A planet's *albedo* is a measure of the amount of stellar energy which is reflected away from the planet's surface (or its upper atmosphere). This quantity ranges from 0 to 1, with 0 indicating a perfectly flat-black surface and 1 indicating a perfectly reflective surface. Energy which is reflected in this fashion doesn't contribute to the planet's heat budget.

Refer to the Planetary Albedo Table to get a base value for albedo. Each planet type has a different base value (for Earthlike worlds, the base value also depends on hydrographic percentage). Then roll 3d and multiply by 0.01, adding the result to the base albedo to get the actual albedo.

Planetary Albedo Table

Planet Type	Base Albedo
Hostile (SG)	0.50
Hostile (N)	0.20
Hostile (A)	0.50
Earthlike (less than 30%)	0.02
Earthlike (30% to 59%)	0.10
Earthlike (60% to 89%)	0.20
Earthlike (90% or more)	0.28
Desert	0.02
Rockball	0.02
Icy Rockball	0.45
Icy Rockball (sulfur volcanoes)	0.80



Greenhouse Factor

Next, we determine the *greenhouse factor* which exists on the planet. This is a measure of the amount of heat that is retained by the planet's atmosphere. Use the following to estimate it.

$$E = B \times (P / G)$$

E is a measure of the planet's greenhouse effect. **B** is the base value for the planet type, taken from the Greenhouse Effect Table. **P** is the surface atmospheric pressure, and **G** is the surface gravity.

Greenhouse Effect Table

Planet Type	Base Greenhouse Factor
Hostile (SG)	0.20
Hostile (N)	0.20
Hostile (A)	0.20
Earthlike	0.15
Desert	0.15
Rockball	0.00
Icy Rockball	0.00
Icy Rockball (sulfur volcanoes)	0.00

"Anyone who thinks an Xboat is cramped has obviously never had to share a fresher with three teenaged siblings."

— Comedian
Anton Wilson
Peale

Average Surface Temperature

First, determine the *blackbody temperature* of the world:

$$B = (278 \times \text{Fourth root of } L) / \text{Square root of } R$$

B is the blackbody temperature, the average temperature (in kelvin) that a body in the planet's orbit would have if it had perfect heat-absorbing and heat-radiating properties. **L** is the luminosity of the primary star in solar units, while **R** is the planet's orbital radius in AU.

The average surface temperature of the world is given by:

$$T = B \times [\text{Fourth root of } (1 - A)] \times (1 + G)$$

Here, **T** is the average surface temperature in kelvin, **B** is the blackbody temperature, **A** is the albedo, and **G** is the greenhouse factor. This temperature should only be considered approximate, since there are many other significant factors. For ocean worlds, refer to the Planetary Climate Table to find the world's climate category in terms from *GURPS Space* (see p. S109).

Planetary Climate Table

Temperature Range	Climate
238 K or less	Uninhabitable (Frigid)
239-249 K	Frozen
250-260 K	Very Cold
261-272 K	Cold
273-283 K	Chilly
284-294 K	Cool
295-302 K	Earth-normal
303-308 K	Warm
309-313 K	Tropical
314-319 K	Hot
320-324 K	Very Hot
325 K or more	Uninhabitable (Torrid)

"Why did I become a comedian? Look, I was in the Scouts. When you've seen as much of the universe as I have, you realize how absurd it is."

— Comedian
Anton Wilson
Peale

Rhylanor (IV)

Rhylanor's size parameter is 0.25, so the planet is of size class Small. The GM doesn't bother with the correction. Checking the World Type Table, the GM finds that Rhylanor is of Desert type.

Rolling for the atmospheric pressure, the GM gets an 8 and records a pressure of 0.4 standard atmospheres. This makes the atmosphere Very Thin, which matches the planet's record in *Behind the Claw*.

Hydrographics are a thornier problem. The modified roll for hydrographic coverage would be 2d-8 (-2, +2 for an M-type primary, -8 for a Desert world in the life zone). The published coverage of 40% is possible, but unlikely (it would require a natural 12 on the dice if rolling randomly). The GM decides that Rhylanor is in an unusually "wet" phase of its evolution at present. The human population is probably using high technology to maintain the planet's seas in their current state.

The GM rolls 2d+6 on the Native Ecosphere Table and gets a 17, indicating that Rhylanor has primitive multi-celled native life. This helps the GM to justify his next violation of the world-design rules. Normally a Desert world would not have an oxygen-nitrogen atmosphere, however thin, but the listing in *Behind the Claw* records Rhylanor as having such an atmosphere. The GM decides that the planet's native life maintains some free oxygen in the air, though it's not enough for human beings to breathe without mechanical assistance.

The GM now turns to determine the planet's overall climate, hoping that it will fall into the "Normal" range listed in *Behind the Claw*. He rolls randomly for albedo, getting a value of 0.15. The greenhouse factor is 0.12. The blackbody temperature turns out to be 275 kelvin, and the average surface temperature is 295 kelvin or 71°F. This falls (barely) in the Normal climate range, so the GM stops. Had the temperature fallen outside the range, the GM had many ways to adjust it.

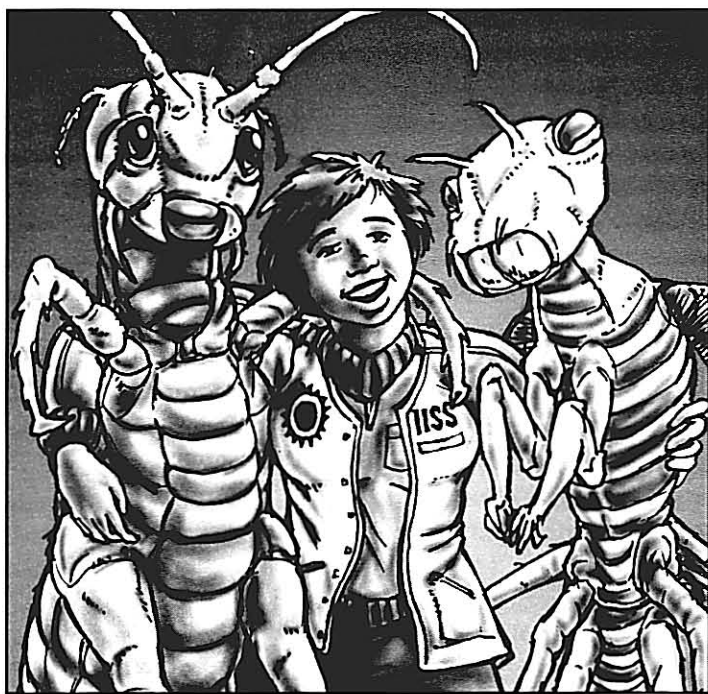
The modified roll for weather factor is 1d (1d+7, -4 for the slow rotation, -3 for the Very Thin atmosphere). The GM rolls a 5 and decides that Rhylanor has fairly placid weather.

Finally, the GM rolls on the Resource Value Table and gets a 13, indicating an Average resource level. This seems strange given the planet's unusual density. Still, the mechanics of crust chemistry are complicated and it's possible that many valuable minerals simply haven't been laid out as accessible ore deposits.

Climate Details

The “average surface temperature” generated in the main rules is just that – an average for the world’s surface. Temperature will vary widely by place and time. Here are some guidelines for determining what local temperatures are likely to be on most terrestrial worlds.

These rules refer to the planetary hex map blank found in *GURPS Space*. We will refer to *hex rows* on that map, equivalent to latitude parallels, by number. The hex rows immediately adjacent to the equator will be numbered 1. Each row north or south will have one higher row number. For example, the rows at the transition between contiguous and separated map triangles (equivalent to the 30th parallels North and South) are numbered 5. The single hexes at the North and South Poles are the hex “rows” numbered 13.



Latitudinal variations: The climate category for a planet is equivalent to the climate category found in hex rows 4-5. Hex row 1 will average two climate categories warmer, hex rows 2-3 will average one category warmer, hex rows 6-7 will average one category cooler, hex rows 8-9 will average two categories cooler, hex rows 10-11 will average three categories cooler, and hex rows 12-13 will average four categories cooler.

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The average temperature can be converted from kelvin to degrees Fahrenheit by:

$$F^{\circ} = (1.8 \times K) - 460$$

F is the temperature in degrees Fahrenheit and **K** is the temperature in kelvin.

Example

Haven is an Earthlike world with 73% hydrographic coverage, so the base albedo is 0.20. The GM rolls 3d for 12, so the actual value for the planet’s albedo is 0.32. The greenhouse factor is 0.13. The planet’s blackbody temperature is 272 K, and its average surface temperature is 279 K, or about 43° Fahrenheit. The GM records the planet’s climate category as Chilly. To determine the weather factor, he rolls 1d+5 (+7, -1 for the Chilly climate, -1 for the Thin atmosphere) and gets a 7. Haven’s weather is somewhat less “interesting” than that of Terra.

STEP 18: RESOURCE VALUE

GURPS Space includes a system for determining the abundance of specific resources on any given world. The system there depends not only on the physical characteristics of a world, but also on the level to which local resources have been developed. Here, we are concerned only with the richness of the local geology and ecology.

Procedure

Roll 3d and refer to the Resource Value Table. The result will yield a general resource abundance and a Resource Abundance Modifier. The GM may apply this modifier to all rolls for the abundance of specific resources, when using the system from *GURPS Space* (see p. S111).

Resource Value Table

Roll (3d)	Overall Value	Modifier
3-4	Very Poor	-2
5-6	Poor	-1
6-14	Average	+0
15-16	Rich	+1
17-18	Very Rich	+2

Example

For natural resources, the GM rolls 3d and gets a 6. Haven is a Poor world with respect to overall resources, and the GM can apply a -1 to any resource-abundance rolls when determining trade parameters.

WORLD MAPPING

Designing realistic world maps is an art rather than a science, since there are so many factors involved. We present a few general guidelines for terrestrial worlds here. If you want greater realism, some basic texts in geography and geology might be in order. The Bibliography cites several worthwhile books on the subject.

One good way to map a world is to use the equal-area icosahedral projection suggested in *GURPS Space*. There, the planetary surface is mapped on a hex grid so that each hex represents about the same amount of surface area. The scale of the map depends on the size of the planet. Multiply the planet’s diameter by 0.07 to get the width of each hex.

LANDFORMS

Land and Ocean

The best way to draw continents and oceans on the planetary map depends on whether land or water is more frequent. If the hydrographic coverage is under 50%, draw the seas, otherwise draw the continents. The planetary map blank used in *GURPS Space* has 812 hexes in it, so every percentage point of hydrographic cover implies about 8 hexes of water or land surface.

There will be a hierarchy of bodies of water (or land masses). For example, on Terra the vast majority of the land makes up the six major continents, with one land-mass (Eurasia) representing almost 40% of the entire land surface of the planet. A good rule of thumb is to place about 90% of the minority surface type in a few large bodies (say, 1d of them). Then scatter the rest as small seas or islands, for no more than a few hexes each. This rule can be relaxed if the minority surface type is very rare. For example, a world with less than 5% water coverage may have all of its surface water in the form of scattered lakes, with no major seas at all.

On an Earthlike world with active plate tectonics, islands will tend to occur in definite patterns. "Chains" of islands (like the Hawaiian archipelago) will exist in the midst of the ocean, possibly indicating a partly submerged land mass or a sequence of volcanic islands. "Arcs" of islands (like the Japanese archipelago) tend to parallel the edges of continents, and are associated with volcanic activity at the edges of tectonic plates.

Mountains and Volcanoes

Mountains will also appear in chains or ranges. Mountain-building usually takes place along the edges of tectonic plates.

Sometimes mountain chains occur at the edge of a continent. As a light continental plate slips over an oceanic plate, driving it down into the planet, mountains are built through processes of fault-block lifting and volcanic eruption. Such mountain chains are associated with earthquake activity and vulcanism. On Terra, the Rockies and the Andes are the best examples of such mountains, formed where the two American plates ride over the Pacific plate.

Mountain chains can also appear in the middle of a land mass, where two continental plates are colliding. Where this happens, massive "foldbelt" mountain chains are pushed up. Such mountains can be very high and massive, but are not necessarily associated with earthquakes or volcanos. The best example on Terra is the Himalayas, formed where the Indian subcontinent is colliding with the bulk of the Asian continental plate.

Assuming a level of tectonic activity similar to Terra's, about 10% of the total land area would be a reasonable number of Mountain terrain hexes. Worlds currently in the midst of heavy tectonic activity might have more (and higher) mountains, while worlds in a quiet phase would have fewer. At the GM's discretion, a few hexes can be designated as Volcanic terrain, indicating the presence of geothermal areas, active volcanoes, or upwelling zones.

After mountain-building ends in a region, erosion begins to wear down the peaks and give rise to hilly or rough country. About the same number of hexes as have been designated Mountain terrain should be designated Hills/Rough terrain. These hexes can appear in chains by themselves, to indicate where old mountain chains once existed (the Appalachian Mountains on Terra are an example of this). Alternatively, Hills/Rough hexes can be placed adjacent to Mountain hexes, to indicate foothills and "badlands."

Climate Details

[Continued]

Seasonal variations: Greater axial tilt makes for greater variation in temperature through the seasonal cycle. During local summer, the climate category should rise above the average by about one level for every 18 degrees of axial tilt. During local winter, the climate category should fall below the average by about one level for every 12 degrees of axial tilt.

Seasonal variations will not always be felt everywhere on the planet, so the GM should decide what hex rows receive their full impact. A planet with very little axial tilt would only experience seasons very near the poles (and those variations would be slight in any case). A planet with very high axial tilt (40 degrees or more) would feel at least some seasonal effect all the way down to the equator. For moderate cases (25 degrees) it's reasonable to apply the full seasonal effect to hex rows 7-13.

Daily variations: Naturally, temperatures tend to rise during the day and fall at night. Such variations don't usually go so far as to change a location's climate category in the course of a day, however. Assume that the local climate category will rise above the average by one level during the day, and fall below the average by one level during the night, for every 40 hours of the planet's day length. This effect will not cause the local climate to rise or fall more than five levels.

All of these variations will be much reduced if the location is on or near a large body of water. Oceans act as a "heat reservoir" to damp out short-term fluctuations in temperature. Assume that the presence of nearby ocean will reduce the sum of seasonal and daily variations by up to one climate category.

These three effects are cumulative. For example, take the planet Haven. Its overall climate category is Chilly, it has an axial tilt of 19 degrees, and its day length is about 28 hours. A seacoast settlement in hex row 8 would have an average climate category of Very Cold due to latitudinal effects. It would experience the full range of seasons, rising about one climate category during the summer and falling about one and a half categories during the winter. The daily shifts would be less than one climate band either way, and can be considered as being damped out by the nearby ocean. Bearing all this in mind, the GM decides that the settlement reaches a Cold climate at the height of summer, but will be Uninhabitable (Frigid) during the long winter nights.

Mapping Tide-Locked Worlds

When drawing a planetary map for a world that's tide-locked with respect to its source of heat and light, the usual procedures don't work well. Here's an alternative that takes account of the drastic differences between the day and night faces.

Instead of placing the North Pole of the world at the top of the planetary map grid, place the "hot pole" (the sub-stellar point) there. Then the top half of the map grid, "above the equator," will be the world's day face. The bottom half will be the world's night face, with the "cold pole" at the very bottom. The twilight zone, which is most likely to be habitable, will be near the "equator" of the map grid.



If the world is at all habitable, ignore the usual rules for placing climatic zones. The average surface temperature generated in Step 17 will hold for hex rows 4-5 on the day face. Hex rows 6-7 on the day face will average one climate category warmer, hex rows 8-9 two warmer, hex rows 10-11 three warmer, and 12-13 four warmer. Hex rows 2-3 on the day face will average one climate category cooler, and hex row 1 on both faces will average two categories cooler. On the night face, climate category will fall by one category for *each* hex row away from the "equator," so that the region around the "cold pole" will almost certainly be Uninhabitable (Frigid). Naturally, there will be no daily or seasonal climate variations!

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CLIMATE ZONES

Several of the terrain types described below have specific requirements for local climate. The GM should use the sidebar on p. 76 as a guide when deciding how to place these terrain types.

Polar Climates

Ocean worlds may have regions of permanent ice cover near their poles. Ice cap terrain occurs where the local climate is no warmer than Very Cold year-round. If such a region exists and is completely composed of land hexes, then place Icy/Barren hexes to mark the presence of the ice cap. If a potential ice cap extends out into water hexes, however, it's possible for warm currents from the equatorial zone to prevent the formation of permanent ice. The GM should decide whether this happens on any given world.

Any ocean world with ice caps will also have a zone of *tundra*. This is open, marshy terrain where the soil is permanently frozen. The GM should place Tundra hexes on land adjacent to the ice caps.

Desert Climate

Once the landforms and polar zones have been marked off, desert terrain can be placed. Deserts occur for several different reasons.

Mid-latitude deserts appear because of large-scale patterns of air circulation. On most Earthlike worlds, a persistent pattern causes warm, moist air to rise above the equatorial zone, moving away from the equator and releasing its moisture as heavy rain. The cooling air masses, now dry, descend at about 30 degrees north and south latitude, absorbing moisture and causing arid conditions. On Terra, the Sahara Desert is the most prominent example of this phenomenon. A similar pattern occurs closer to the poles, creating the extremely dry conditions there.

On the planetary map, the 30-degree parallels are in the hex rows where the apparent transition from "contiguous" to "separated" map triangles takes place. If the GM can find a group of at least 10 contiguous land hexes anywhere on or near these lines, he should consider placing mid-latitude desert in that region. In this case, the Desert hexes may even be adjacent to ocean hexes.

Rain-shadow deserts occur where moist air crosses over a mountain chain on its way from the ocean into land. As the air is deflected upward, it cools, and the moisture it carries condenses and precipitates out as rain or snow. On the landward side of the mountains, the air no longer holds moisture. Instead, it descends and absorbs moisture from the land, creating desert conditions.

Rain-shadow deserts should be placed adjacent to Mountain hexes, preferably on the landward side of a mountain chain that is itself on the edge of a continent. If the GM can find even two or three hexes that fit these requirements, he should consider placing Desert terrain there. Naturally, rain-shadow desert should not be placed adjacent to ocean.

Continental deserts occur when a land mass is so large that moisture-carrying air is simply unable to penetrate to the center. Any land hexes that are four or more hexes away from the ocean are good candidates for continental desert. The GM should avoid placing such deserts too close to the polar regions, however.

Jungle

After placing desert terrain, the GM should see if any part of the planetary map is a good candidate for jungles. Jungle (or more precisely, "tropical rain forest") can appear in any region where the local climate is Warm or Tropical at all times, and where there is plentiful moisture (i.e., within four hexes of ocean, but not adjacent to an already-placed desert). Jungle terrain can appear on large or small islands, if they fall into the right climate zone.

Other Terrain

Any terrain not already assigned a terrain type (i.e., not Mountain, Hills/Rough, Ice Cap, Tundra, Desert or Jungle terrain) is considered "Mixed" terrain. Mixed terrain is probably some mix of forest and prairie or savanna in wilderness areas. On an inhabited world, the local population will cultivate Mixed terrain, and will build most urban centers there as well.

ANIMAL ENCOUNTERS

Whenever explorers enter a working ecosystem, they will naturally find themselves dealing with the local flora and fauna. Here we will lay out a system that can be used to generate varied and interesting animal encounters on any alien world. GMs who plan to make frequent use of animal encounters should find *GURPS Bestiary* a good source for ideas on roleplaying animals.

ENCOUNTER TABLES

Every living thing has its own natural habitat, the environmental situation that it is best adapted to survive in. Whenever an adventure will involve wilderness travel on a new world, the GM should create one or more encounter tables for the major terrain types the PCs are likely to visit. An encounter table defines a *community* of living organisms, a set of species which live in the same area and interact while they go about the business of living.

Elements of Community

Underlying each community is a set of *producers*, species that do not need to eat other organisms to live. Producers gather nutrients from the nonliving environment, and gather energy from some naturally occurring source. The most typical producers on Earthlike worlds are *plants*, which use inorganic matter from the soil and energy from sunlight to produce their food. Producers are the keystone of every ecosystem. All other organisms are *consumers*, living off the energy that the producers bring into the community.

On Earthlike worlds, producers often fall into two classes, according to their survival strategy. *Point producers* are large, robust, long-lived organisms. They compete to grow higher and spread farther than their rivals. Typical Terran point producers are trees. *Area producers*, on the other hand, pursue a strategy of scattering many small organisms into every available growth site. Typical Terran area producers are grasses and other ground-cover plants. Area producers can be found almost anywhere, even under very harsh conditions. Point producers, on the other hand, are most likely to appear where local resources (water and good soil) are plentiful and the only limiting factor on growth is sunlight.

The first consumers to consider are *primary consumers* or *herbivores*, animals which eat only plant material. Most ecosystems include a variety of very small herbivores (such as worms or insects). These form a critical part of the community they live in, but are rarely noticed except by biologists. Larger herbivores can be of more interest to casual observers, as potential game animals (or potential threats, since some herbivorous animals can be very dangerous).

Mapping Tide-Locked Worlds

[Continued]

Place any liquid water in the zone where climate is Cold to Hot. Colder hex rows will have permanent ice cap, while hotter hex rows will be permanent desert. Any hex on the night face which is not ice-capped will be Barren, since there is no light to foster plant growth. The permanent hot zone will tend to pull air dayward across any open water, causing it to rise and drop its moisture on the land. Hexes immediately dayward of open water may be Jungle terrain if they are at least Warm, otherwise they will be Mixed. Hexes which are on the day face, nightward of any open water but not ice-capped, will be Tundra or Desert terrain. The GM should use common sense or his imagination to resolve any situations not covered here.



Food Strategies

Below are some of the many ways an organism may sustain its life.

Filters are herbivores which live by allowing the environment to pass through their bodies. Most filters are aquatic in nature, pulling edible matter out of the water they live in. They are often unable to move, and so are not dangerous unless an adventurer is careless enough to enter their intake. Terran example: barnacles.

Grazers are herbivores which eat low-value food such as grass. They tend to spend most of their time eating. They may be solitary, but are more likely to move in herds for defense. Their primary defense is flight, which can cause dangerous stampedes if observers get in the way. If they are forced to fight, they will defend themselves fiercely. Terran example: antelope or horses.

Browsers are herbivores which eat foods of moderate value, such as leaves or shoots. They spend less of their time eating, and are more likely to be solitary animals. Their usual response to a threat is to hide or "freeze." Terran example: deer or elephants.

Pouncers are carnivores which attack prey by stalking it or attacking from ambush. Since a pouncing attack is difficult to coordinate, pouncers tend to be solitary animals. They will attack if they attain surprise and the target is recognized as potential prey, otherwise they will tend to avoid an encounter. Terran example: leopards or tigers.

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Food Strategies

[Continued]

Trappers operate in similar fashion to pouncers, but instead of tracking or ambushing prey they construct traps and wait for prey to fall in. Any creature falling into the trap is attacked, but those which avoid the trap are usually ignored. Trappers rarely stray far from their prepared position. Terran example: spiders (there are few examples of large trappers on Terra).

Chasers are carnivores which use stalking behavior to locate prey, but run the prey down using a burst of superior speed. Chasers behave somewhat like pouncers, attacking only if they have a clear advantage. Terran example: cheetahs.

Herders are similar to chasers, but they use pack tactics rather than speed to bring down their prey. Herders are often willing to attack much larger animals, or to move in on a larger group to cut one animal off. Terran example: wolves.

Scavengers are carnivores in a sense, but they don't hunt for prey. Instead, they live by eating the remains of other animals, either moving in on the kill of another carnivore, or finding the carcasses of animals which die of natural causes. Scavengers almost never attack other animals, although some scavenger species operate in groups to intimidate other carnivores into abandoning their kills. Terran example: jackals or vultures.

Gatherers are omnivores which tend toward herbivorous behavior. They eat high-level plant material such as fruit or seeds most of the time, but sometimes catch insects or small game. They are similar to browsers in their behavior. Terran example: raccoons or chimpanzees.

Hunters are omnivores which tend toward carnivorous behavior, eating mostly small game. Hunters resemble chasers in their behavior. Terran example: bears or humans.

Eaters are true omnivores, which are willing to eat almost anything they can find. They can be rather dangerous, as they have little fear of any other creature and may attack without apparent provocation. Terran example: army ants (if an entire swarm is considered one animal).

Another class of consumers are *omnivores*, animals which can eat both plants and animals. Omnivores can be solitary or group-living animals, and tend to be of fairly high intelligence. *Carnivores* occupy the highest level on the "food pyramid" in any given community, eating only other animals. They also tend to be of high intelligence, although many carnivores are too strongly specialized to be good candidates for complete sentence.

Designing Encounter Tables

No matter what the environment, the numerical relationships between producers, primary consumers and higher consumers is about the same. Energy is lost at each stage of consumption, so a given mass of plant matter can only support a much smaller mass of primary consumers, which can in turn support an even smaller mass of higher-level consumers. Since carnivores tend to be larger than herbivores, this implies that meat-eaters are *much* less common than their prey. The numbers of each level of consumer are therefore dependent on the richness of the local population of producers, and *almost nothing else*.

We represent a local biological community by way of an encounter table. See the Encounter Table Template below. The "probability of encounter" depends on the richness of the local community. Each slot on the template represents an animal species, which can be designed using the rules that follow.

Encounter Table Template

Probability of Encounter on **X** or less

Roll (3d)	Species Type
3	Herbivore
4	Herbivore
5	Herbivore
6	Herbivore
7	Herbivore
8	Herbivore
9	Herbivore
10	Herbivore
11	Omnivore
12	Omnivore
13	Omnivore
14	Carnivore
15	Carnivore
16	Carnivore
17	Carnivore
18	Carnivore

X is the Encounter Number from the Biome table on page 81.

Begin setting up an encounter table by referring to the Biome Table. Each major terrain type has its own *Encounter Number*. A 3d roll is made every four hours and if the result is equal to or less than the Encounter Number, an animal encounter occurs. There is also a *Type Modifier* and a *Size Modifier*, both of which are applied when designing specific animals for the encounter table. Once these items have been recorded, use the rules below to generate enough animal species to fill in the table.

"Look, kid. Life out here isn't like in the arcology. Yeah, I know you know that. You don't know it in your guts, though. Down deep, you expect your air to be free, your meals on time, your day's work routine and your three-vee program ready to watch in the evening. Well, kid, that's civilization, and you've been taking it for granted all your life. Now you're going out where it hasn't been built yet."

— Ravi Shah,
Exploration Office

Biome Table

Terrain Type	Encounter	Type	Size
Tropical Forest, Jungle	15	-3	+0
Temperate Forest, Woodland	12	-4	-2
Polar Forest, Taiga	6	-4	-3
Scrub Forest, Chaparral	9	-2	-2
Grassland, Savanna	12	+4	+1
Polar Plains, Tundra	6	+2	-1
Wetlands, Swamp	9	+0	+0
Desert, Dunes	6	+3	-2
Mountain, Alpine	9	+0	-2
Glacier, Ice Cap	6	+0	-1
River, Stream	2	+1	-1
Shoreline, Coast	12	+3	+1
Shallows	15	+2	+2
Deep Ocean	12	-4	+3
Ocean Bottom	9	-2	+1

Social Strategies

Solitary animals spend most of their time fending for themselves, avoiding other members of their species. They can be very territorial, acting aggressively to drive intruders out of their favored grounds. Solitary animals normally meet only during a defined mating season. Terran example: bears.

Pair-Bonding animals behave like solitary animals, but they tend to form mated pairs that cooperate and share territory. Terran example: monogamous birds such as geese.

Small Group animals tend to move in family groups. Sometimes the young remain with their parents for a time even after becoming adults. In other species, siblings travel and hunt or forage together even as adults. Terran example: lions.



SURVIVAL STRATEGIES

The level an animal holds in the local "food pyramid" is an important factor in determining its physiology and behavior. Each category, however, can be further divided according to *how* the animals get the food they eat. Species also differ according to how their members behave toward each other.

Procedure

Roll 2d on the Food Strategy Table, checking under the column for the current species' overall type. Modifiers: add the Type Modifier for the local terrain. The result is the exact survival strategy used by the species.

Food Strategy Table

Roll (2d)	Herbivores	Omnivores	Carnivores
0 or less	Filter	Gatherer	Trapper
1	Filter	Gatherer	Pouncer
2	Filter	Eater	Trapper
3	Browser	Gatherer	Pouncer
4	Browser	Eater	Scavenger
5	Browser	Gatherer	Scavenger
6	Browser	Hunter	Pouncer
7	Grazer	Hunter	Herder
8	Grazer	Hunter	Chaser
9	Grazer	Gatherer	Chaser
10	Grazer	Eater	Scavenger
11	Grazer	Hunter	Herder
12	Grazer	Gatherer	Trapper
13 or more	Grazer	Gatherer	Chaser

Large Group animals form packs or troops, in which not all the members are directly related. These groups can exhibit a wide variety of social and communicative behaviors, as they cooperate in foraging, hunting, or defense. Terran example: wolves or humans.

Small Herd and *Large Herd* animals are very social and gregarious. If a herd animal is found alone it is probably physically or emotionally ill, and can be very dangerous. Herd animals are most often herbivores, which use their group tactics to defend against predators. Terran example: elephants or horses.

Hive animals are so gregarious that they have little or no individual behavior, all effort being directed toward the survival of the group as a whole. Terran example: social insects such as ants or bees (a few small mammals exhibit a similar social structure).

Domesticable Animals

Many wild animal species can be captured and tamed. Humans have made pets of a tremendous variety of animal species. True domestication goes deeper than taming, however. A domesticated animal species is selectively bred in captivity, for use by humans (or aliens) who control its food supply and reproduction. Domesticated animals can be raised to serve as pets, but will also serve as supplemental labor or a food source. It turns out that very few animal species are suited for complete domestication.

A domestic animal will almost certainly be an herbivore, or an omnivore that can get by on a vegetarian diet. Domesticated carnivores will be small, and will not be used for food except in very unusual circumstances. Herbivores and vegetarian omnivores are much more efficient than carnivores, requiring less effort to keep fed.

Domestic animals must also be fairly easy to raise. Many animals are unwilling to breed in captivity. Others may not breed often enough, or grow to adulthood quickly enough, to be worth raising.

A domestic animal must also have a relatively calm and unaggressive disposition. Some animals are simply too dangerous to tame. Others bite or strike out at their handlers, too often to be reliable for domestic use. Still others are not dangerous, but have a tendency to panic at the slightest sign of danger, fleeing blindly and even running into obstacles in their haste to escape. An animal with any of these habits will be hard to keep safely confined.

Finally, domestic animals usually come from species which live in troops or herds in the wild. Social animals are easy to tame because human beings can make themselves seen as "part of the herd" or "leaders of the pack." Also, animals that live in large groups are less likely to be aggressive or panicky.

Assume that any animal on an encounter table is a candidate for complete domestication if it is between 100 pounds and 2,000 pounds in mass, is not a carnivore, and lives in a Large Group or a Herd. Such an animal will be domesticable on a 15 or more on 3d. Other animals are probably not domesticable in this sense (although many species can be tamed, and small species are more likely to be useful than large ones).

Then roll 2d on the Social Strategy Table. Modifiers: +4 for grazers, +2 for browsers, -3 for pouncers, -4 for trappers, -2 for chasers, +1 for herders, +2 for gatherers, +1 for hunters, +2 for eaters. The result is the preferred social structure for the species, along with typical numbers for an encounter. The GM should use common sense to modify the encounter numbers given. Species will tend to congregate in larger numbers where food is plentiful, and be more solitary in harsh terrain.

Social Strategy Table

Roll (2d)	Structure	Number Encountered
5 or less	Solitary	1
6-8	Pair-Bonding	1d-3 (minimum 1)
9-10	Small Group	1d-1 (minimum 1)
11-12	Large Group	1d+2
13	Small Herd	3d
14	Large Herd	6d (or more)
15 or more	Hive	8d (or more)



BODY PLAN

Swimming or flying animals are usually specially adapted to their lifestyle. Aside from these adaptations, an animal's exact physiology is usually not very important to the course of an encounter. In other words, "they look like they look." The GM should feel free to decide how many limbs an alien animal has, what shape its body has, and so on.

Of course, the higher animals on any world are likely to be related (assuming that none of them were "imported" by interstellar visitors). The physiology of even distantly related species will bear some similarities. For example, on Terra almost all the higher animals are members of certain classes of the subphylum *Vertebrata*. These animals are characterized by an internal bony skeleton, a long spinal cord with brain and sensory cluster at the front end, and four limbs (some of which may be undeveloped or *vestigial*). If we found a large, intelligent animal with a significantly different structure – a different arrangement of the nervous system, say, or *six* working limbs – we would be hard-pressed to understand its place in local biology. The GM designing animal encounters for a world may want to consider matching the physiologies for most of the species, representing such major lines of evolutionary heritage.

Procedure

Roll 2d on the Special Features Table. Modifiers: +2 if the planet's diameter is less than 4,500 miles, +1 if it is between 4,500 and 7,499 miles, -1 if it is 8,000 miles or more. -2 if the planet's atmosphere is Very Thin, -1 if it is Thin, +1 if it is Dense, +2 if it is Very Dense.

Special Features Table

Roll (2d)	Wetlands	River	Shore	Ocean	Other
2 or less	S (-6)	S (+1)	S (+1)	S (+2)	–
3	A (+1)	A (+1)	A (+1)	S (+2)	–
4	A (+2)	–	A (+2)	S (+2)	–
5	–	–	–	A (+2)	–
6	–	–	–	A (+0)	–
7	–	–	–	S (+1)	–
8	–	–	–	S (-1)	–
9	–	–	–	T (-7)	–
10	–	–	–	T (-6)	F (-6)
11	F (-6)	F (-6)	F (-6)	F (-6)	F (-5)
12	F (-5)	F (-5)	F (-5)	F (-5)	F (-4)
13	F (-4)	F (-4)	F (-4)	F (-4)	F (-2)
14 or more	F (-2)	F (-2)	F (-2)	F (-2)	F (+0)

The table may yield a letter code, indicating whether the animal has any special features. *A* means that the animal is an *amphibian*, spending most of its time in the water but able to emerge onto land. *F* indicates a *flying* animal, which can use wings, a lighter-than-air gas sac, or some other mechanism to move through the air. *S* means a *swimming* animal, which spends all of its time in the water. *T* signifies a *triphibian* animal, which prefers to live in water but can also walk on land and fly in the air. Note that if an animal has *no* special features, it is automatically a land animal.

The table may also yield a modifier, which should be added to the Size Modifier for the local terrain type. In general, flying animals are smaller and swimming animals larger.

Woods Devils

The GM wishes to design an animal for a woodland environment on the planet Haven. He is trying to fill a carnivore's slot on the appropriate encounter table, and hopes that the animal will prove a challenge to wilderness explorers.

The Type Modifier for the woodland biome is -4, so the GM rolls 2d-4 on the Food Strategy Table for a 5. The animal in question is a scavenger. He rolls 2d on the Social Strategy Table for a 5, finding that the animal has solitary habits. Haven's diameter is 6,300 miles and its atmosphere is of Thin density, so the roll on the Special Features Table is 2d. The GM rolls a 9, so the animal has no special features (in other words, it's a land animal).

The total Size Modifier is -2, from the Biome Table only. The GM rolls a 7, finding that the animal's average mass is 150 pounds (roughly human-sized). He decides that the animal is a trifle stronger than its mass would indicate, and records a ST score of 11. The base number of Hit Points is 10. He rolls 2d on the Animal Build Table for a 10, finding that the species has a Very Robust build. The base HT score is 16, and the final number of Hit Points from the tables is 12. Since this last is between 10 and 20, the GM simply uses the HT score for hit points as well.

The GM then rolls 2d+2 twice on the Animal Weapons Table, getting a 9 and a 12. The animal's main attack mode is a bite with its fangs. Referring to p. B140, the GM determines that the animal's bite does 1d-2 impaling damage. He rolls 3d+1 to determine if the animal has any natural poison or venom, and gets a 12, indicating none. Finally, he rolls 2d+1 on the Animal Armor table, rolling a 12 (but *not* a natural 12, given the modifier). He decides that the animal has Heavy Scales for PD 1, DR 1.

The GM rolls 3d+1 on the Animal IQ table for a 9, and finds that the animal has IQ 4, roughly comparable to a big cat in intelligence. He rolls 3d+1 on the Animal DX table for a 10, so the animal has DX 12. He has already decided that most dominant life-forms on Haven are four-limbed, so the base Speed for the animal is (16 + 12)/3 or about 9. Since the animal is fairly large for its environment, and since scavengers don't need a great deal of speed, the GM decides to reduce this value to 8. The animal's Dodge is therefore governed by its DX score and comes out to 6.

The animal's data block looks like this:
ST: 11 **Spd/Dodge:** 8/6 **Size:** 1 hex
DX: 12 **PD/DR:** 1/1 **Mass:** 150 lbs.
IQ: 4 **Damage:** 1d-2 imp
HT: 16 **Reach:** C

Continued on next page . . .

Woods Devils

[Continued]

After thinking about it and checking through the *GURPS Bestiary*, the GM decides that this scavenger is a little like a hyena. It's about the same size, perhaps a little tougher, but slower and more likely to run alone. No one likes hyenas, so this beast is probably not popular either. He decides that it is called a "woods devil" by the people of Haven. It normally avoids humans, although it has been known to attack sleeping or injured woodsmen. It has repulsive dietary habits, an unpleasant appearance, and an uncanny moaning cry. The people of Haven dislike woods devils intensely, and only local environmental law prevents hunters from exterminating the species whenever its range impinges on human territory.

"The people I pity are the tender crews – they're the ones who have to deal with Xboat pilots as part of their job, whereas the rest of us can simply shoot them if they get too stropky."

– Comedian Anton
Wilson Peale

Evaluation

As always, the captain walked into the survey center without fanfare. Or advance notice. "Report."

Lead Surveyor Robinson managed to contain her irritation. "Computer, system schematic, private scope."

A light-point appeared between them, unfolding in seconds to a view of the system under survey. The primary glowed orange-yellow, an ordinary K3 star. Robinson pointed to a fleck of light near the central star, its motion barely visible. "Number Two is the only planet in the biozone. Unfortunately it doesn't work as a candidate. Diameter about twenty-five hundred miles, too small for an atmosphere. Albedo about one-tenth, consistent with naked rock."

Continued on next page...

ANIMAL SIZE

An animal's size controls or influences many of the factors that are important in an encounter.

Procedure

Roll 2d on the Animal Size Table. Modifiers: add the Size Modifier as given by the Biome Table and Special Features Table. Also add +1 for a grazer or filter, -1 for a gatherer, eater or pouncer. If a natural 12 is rolled, roll again with an additional +6 modifier.



Animal Size Table

Roll (2d)	Mass	ST Score	Hit Points
0 or less	1	1	2
1	3	1	3
2	5	2	3
3	9	2	4
4	18	3	5
5	36	4	6
6	75	6	8
7	150	10	10
8	300	16	13
9	600	25	16
10	1,200	40	20
11	2,400	64	25
12	4,800	100	32
13	9,000	150	40
14	18,000	240	50
15	27,000	320	56
16	36,000	390	62
17	45,000	450	67
18	54,000	510	71
19	63,000	560	75
20 or more	72,000	610	78

The size result gives the mass in pounds for an average adult member of the species. The GM should feel free to adjust this average value by up to 20% in either direction, especially at the higher values. Notice that we are referring to the animal's *mass* rather than its *weight*, which can be computed by multiplying mass by planetary gravity.

The size result also yields a ST score for an average adult member of the species. The GM should feel free to adjust this as well, to reflect differing body structures. Flying and swimming animals tend to have lower ST than land animals of the same body mass, for example.

The size result also yields a base number of hit points. This number is relatively insensitive to differences in body mass, but can vary widely depending on the body's *structure* and the animal's general resistance to injury.

Roll 2d on the Animal Build Table. Modifiers: +1 for a grazer, +1 for a swimming animal, -1 for a flying animal, +1 if the local terrain is Tundra or Glacier, -1 if the local terrain is Desert.

Animal Build Table

Roll (2d)	Build	HT Score	Hits Modifier
4 or less	Very Flimsy	13	-20%
5	Flimsy	14	-10%
6-8	Average	15	+0%
9	Robust	16	+10%
10 or more	Very Robust	17	+20%

This result measures how sturdy the animal's build is. "Flimsy" animals have light structural elements and a delicate constitution, while "robust" animals are bulky and healthy. The table also yields a figure for the HT score of an average member of the species. The GM should feel free to adjust this by a point or two, to fit his own concept for the species. Carnivores tend to have slightly lower HT for their build, while herbivores are more resistant to disease.

Finally, the table yields an adjustment to the animal's hit points. If a animal's final number of hit points is between 10 and 20, the GM should ignore the results of the tables and use the animal's HT score for both its "body HT" and its available hit points.



NATURAL DEFENSES

Two of the most important features of an alien animal are "How sharp are its teeth?" and "How thick is its hide?" Hunting omnivores and carnivores tend to have more natural weaponry, while herbivores tend to have more armor. Some animals have no viable attack form at all, yet have such thick defenses that few predators can threaten them.

Evaluation

[Continued]

"That can't be correct," said the captain. "I've gone over the Umakaar group's results myself. Ruins on six planets in this sector, with glyphs or geometric alignments pointing toward this star. This has to be the home system of the Aion civilization."

Robinson shrugged. "You know more xenoarchaeology than I. We'll study the planet in detail if you order it, but you can have my professional opinion already. That planet does not sustain life, and never could."

A third crewman joined their discussion. "Something new, Lead," he said, glancing nervously at the captain.

"Go ahead, Carson," Robinson prompted.

"It's Number Four. We just finished a detailed workup of its satellite system." He gestured into the schematic, at some distance from the star. "Computer, incorporate data file Alpha-three-five-nine and magnify."

Suddenly, Planet Four was no longer a simple point-glow, but a banded white-brown sphere the size of a fist. New sparks hovered in the air nearby. "Four is just outside the biozone," the specialist reminded them. "A large gas giant, emitting significant radiation of its own, mostly in the far infrared."

"Are any of the moons large enough for an atmosphere?" Robinson asked sharply.

The specialist nodded. "This one," he said, pointing to the brightest light. "Mass about point-six. Quite large, even considering its primary's size. We have no spectral reading yet."

Robinson considered silently, holding the captain's gaze for a long moment. Then she nodded decisively. "Tide-locked to the gas giant, of course. Close enough to the primary to keep the atmosphere from freezing out on the far side. Enough heat from the gas giant to keep the near side habitable. It's not a common situation, but it's possible."

The captain smiled slightly. "All right. Concentrate on the gas giant and its moons. I'll order a slow approach."

As he left, the lead surveyor turned back to her team, fatigue forgotten. They had a lot of work to do.

Landing

The herd moved slowly over its range, nibbling at the foliage. Males ranged around the edges of the herd, keeping half an eye out for predators. Females and young stayed close to the center. That was the pattern. No member of the herd knew any other way to live.

A few of the males, always alert to changes in the environment, glanced upward in time to see a white-silver dart drop from the zenith. It fell coldward, its path leveling off as it approached the horizon. Eventually, it disappeared behind the range of low hills that separated the herd's range from the Ring Ocean.

Out of sight, out of mind. The herd returned to the business of living.

Young Chandra got up from his seat as soon as the cutter touched ground. He was already in his suit. Now he pulled the soft helmet over his head, glanced at the ready light, and reached to touch the airlock control.

"Slow down!" laughed Eshkuri. "Go through your checklist."

Chandra shrugged, irritated at the veteran's caution. "We know the air is almost breathable. Even if the seal isn't perfect, we won't be out there long enough to take any harm."

"Don't you want to live as long as I have, and have the pleasure of ruining your juniors' fun? What about trace elements that didn't show up in the spectrograph? Or dust or seasonal pollens? Or greebles?"

Chandra frowned. "Greebles? What are those?"

"I don't know. But they'll kill you stone dead in five minutes. Go through your checklist."

Chandra didn't like being patronized, even by someone twice his age. He fumed, but he also went through the checklist. Eventually, the outer airlock door opened and the two scouts stepped down onto Carson's World.

The sun stood high overhead in a deep-blue sky. Primary's swollen mass was visible even at noon, hanging immobile over the heatward horizon. A cold wind struck through the fabric of their suits for a moment, until the internal thermostats compensated. Green-black foliage covered the ground, blurring the outline of slopes that ran down to the distant seashore. Chandra sniffed reflexively, but smelled nothing but clean recycled air.

Eshkuri was doing deep knee bends. "Feels good to be under light gees for a change. My last assignment was on a heavy world. Rough on the heart."

"There's the object we spotted from the air," said Chandra, pointing. "Let's go see."

Continued on next page...

Weapon Types

Roll 2d *twice* on the Animal Weapons Table to see what weapons are available to the species. Modifiers: -2 if herbivore, +1 if omnivore, +2 if carnivore, +2 if aquatic, -1 if mass is 600 pounds or more.

Animal Weapons Table

Roll(2d)	Weapon Type	Damage
0 or less	Big Horns/Tusks	Thrust/impaling or swing/cutting
1	Spear	Thrust+1/impaling
2	Smashing Tail	Thrust/crushing
3	Butting Horns	Thrust/crushing
4	Horns	Thrust/impaling
5	Blunt Teeth	Crushing bite attack (half ST)
6-9	None	None (Slam attacks only)
10	Sharp Teeth	Cutting bite attack
11	Small Claws	Thrust/crushing
12	Fangs	Impaling bite attack
13	Large Claws	Thrust/impaling or swing/cutting
14	Smashing Tail	Thrust/crushing
15 or more	Spear	Thrust+1/impaling



Each weapon type gives the animal an attack mode, with damage depending on its ST as listed. "Bite attacks" do damage as per the sidebar on p. B140, again depending on the animal's ST (blunt teeth halve ST when making this computation). Animals that have no effective attack modes can still perform

Slam attacks, although weaponless animals tend to avoid combat if at all possible. An animal's attack modes also yield its Reach. Most attack modes work only in close combat (Reach C). Big Horns, Tusks, or a Spear attack will all work at 1 hex range. Note that many of the attack modes match Striker types listed in *Compendium I* (see p. CI66).

Some animals are poisonous. Roll 3d. Modifiers: -3 if the animal's average mass is 9 pounds or less, -1 if it is between 10 and 75 pounds or greater than 600 pounds. -1 if the species is herbivorous, +1 if it is carnivorous, +1 if it is an amphibian or swimmer. +2 if the local terrain is Desert. On a 5 or less, the species has *defensive* poison only, delivered by sweat, a short-range spray, or short spines. Such a poison system is ineffective as a weapon and works by discouraging predators from eating the animal. On a 14 or more, the animal has *offensive* venom which can be delivered by fangs, claws, a stinger or a projected spit. Choose an appropriate venom type from *GURPS Bestiary* (pp. BE78-79) or *Compendium II* (pp. CII147-149).

Some animals have more exotic attack types: a sonic blast, a flash or darkness defense, an electric shock, even a psionic attack. The GM should assign these as he feels appropriate, although very few species should have such weapons.

Armor Types

Roll 2d on the Animal Armor Table. Modifiers: -1 if carnivore (except scavengers), +1 if scavenger carnivore, +2 if herbivore. +1 if the animal's average mass is between 1,200 and 8,999 pounds, +2 if it is between 9,000 and 35,999 pounds, +3 if it is 36,000 pounds or more. -4 if the animal is an amphibian or swimmer, -2 if it is a flyer or triphibian. On a natural 12, reroll with an additional +6 modifier.

Animal Armor Table

Roll (2d)	Armor Type	PD	DR	Special Features
4 or less	Skin with mucous	0	0	Water passage aided
	Oily feathers	0	0	Water passage aided
5-7	Skin	0	0	Can sunburn
	Very thin fur	0	0	
	Downy feathers	0	0	
8-11	Fur	0	1	
	Scales	0	1	
	Feathers	0	1	
12-14	Thick fur	1	1	Best for cold climates
	Spiny fur (Quills)	1	1	Close combat damage
	Heavy scales	1	1	
15-16	Carapace	2	2	
17-18	Armor plates	2	3	
19	Thick armor plates	3	4	
20 or more	Armor shell	3	5	

The table yields the armor type (some of which match types described in *GURPS Uplift* or *Compendium I*). For some die-roll ranges there are several equivalent armor types listed, so the GM should choose one to fit his concept of the animal. The animal's PD and DR follow. Some armor types require special treatment, as noted briefly under Special Features (see *Compendium I* for details).

Landing

[Continued]

It was an easy walk in the light gravity, their boots silent on the thick mats of ground cover. They climbed a low hill and stood before it: a four-sided obelisk of some blue-white stone, standing about twice as tall as a man. No markings were visible, but there were signs of weathering around its edges.

"I wonder what it's made of?" said Eshkuri, reaching out to touch it gingerly. It was very hard.

"We could get the densitometer out here," Chandra suggested.

"Later."



The younger man moved slightly, sighting through the obelisk. "One side faces Primary directly."

"So it does." Acting on an obscure hunch, Eshkuri pulled one of his gloves off. "The air's cold. Feels like air, though."

"After that lecture, you're just going to expose yourself like that?" Chandra demanded.

"First learn to be careful, then you can decide what risks are worth taking. Now hush. I'm trying an experiment." The older man pulled his twenty-year service ring from his finger and reached to draw the setting firmly down one side of the obelisk. It left a barely visible mark. "As I thought. My ring's marked too."

Chandra gaped. "Diamond?"

"Probably the whole marker," Eshkuri said, looking up at it thoughtfully. "You know, it takes a pretty advanced technology to grow an artificial diamond this size. I wonder how long it takes for this thin atmosphere to weather one?"

The two men stood silently, letting the age of the place sink into their bones. On the heatward horizon a few herd animals appeared, silhouetted against Primary's bulk, stopping to watch the strange invasion of their world.

Search

Gwen sighed. "Ten thousand years of spaceflight experience and we still can't design a vacc suit that you can scratch in."

"Repeat, Blue Three. Didn't catch that," said the grav-car's communicator.

"Never mind," she growled. "Proceeding to cover grid square thirty-seven by fifteen."

"Roger that, Blue Three."

She took a moment to look away from the instruments as the grav-car followed its automatic survey pattern. A low range of hills passed five hundred feet below.

I owe myself a break, she thought. "I see something," she told the communicator. "Going in for a closer look."

Once the grav-car touched down, Gwen popped the canopy and clambered out. For a moment, it was sheer animal bliss simply to stretch. Two minutes later she had stripped down to compressor mask and undersuit, and was on her way to the water.

A quick scan assured her that nothing dangerous lurked in the water. Then she waded out, shivering at the cold. For a moment she considered diving, but decided that would be excessive. She contented herself with standing waist-deep, splashing hours of sweat away. Eventually, she turned back to the car – and stopped with a gasp. She wasn't alone.

They were slender, six-hooved creatures with rough brown coats, the species that the expedition had tagged "antelope." Three adults watched her warily as they bent down to drink from the lake. They had colts with them, peering out at her from behind their parents.

As she moved toward the shore, Gwen stubbed her toe on an unseen rock and stumbled, raising a splash. The adults flinched back from the water and turned to flee. That gave her a good view of the largest colt.

It stood on its two back pairs of legs, its forepaws off the ground in a stance that its parents could only match with great difficulty. It stood its ground bravely, eyes lively with intelligence as it confronted a hairless, upright, four-limbed alien. Then it bent down, picked up a pebble, and hurled it at Gwen. Too startled to dodge, she took the blow on her left shoulder.

"Ow!"

Then the antelope, adults and offspring alike, were gone.

Gwen rubbed at the bruise. She hadn't been imagining it. The little beastie had hands.

As soon as she was in the air, she called base camp. At first, the dispatcher wanted to shout at her for abandoning her car, going out unarmed and practically naked. She had the right words to silence him, though.

FINISHING DETAILS

To round out an animal's description, we need to determine its DX and IQ scores and determine how quickly it can move.

Determining IQ

Roll 3d on the Animal IQ Table. Modifiers: -4 if the animal's average mass is 5 pounds or less, -3 if it is between 6 and 18 pounds, -2 if it is between 19 and 36 pounds, -1 if it is between 37 and 75 pounds, +1 if it is 600 pounds or more. +1 if the animal is Solitary, Pair-Bonding, or lives in a Small or Large Group. -2 if the animal lives in a Hive.

Animal IQ Table

Roll (3d)	Species IQ
5 or less	2
6-8	3
9-12	4
13 or more	5

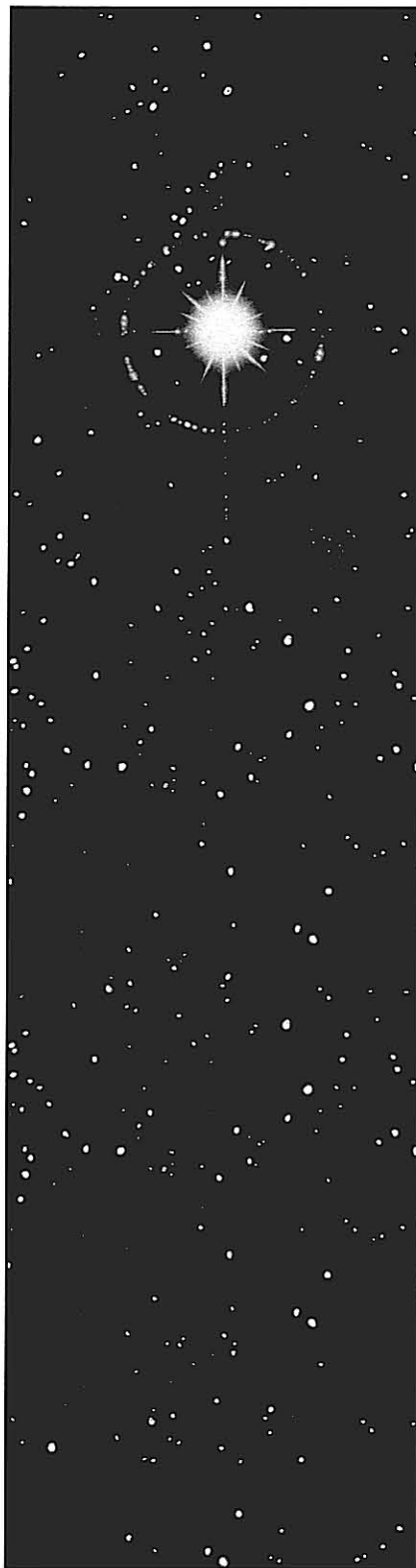
The result is an average value for the IQ score of an adult member of the species. If the species has IQ 5, it may have higher IQ at the GM's discretion, limited by the results from Step 17 of the world-design sequence. Such animals will not normally have IQ higher than 7, since beings with higher IQ border on sentience.

Determining DX

Roll 3d on the Animal DX Table. Modifiers: +2 if the animal's average mass is 5 pounds or less, +1 if it is between 6 and 18 pounds, -1 if it is between 150 and 299 pounds, -2 if it is between 300 and 599 pounds, -3 if it is between 600 and 1,199 pounds, and -4 if it is 1,200 pounds or more. -2 if the animal has a Carapace or Armor Plates, -4 if it has Thick Armor Plates, -6 if it has an Armor Shell. +1 if the animal is a hunter omnivore, +2 if it is a carnivore.

Animal DX Table

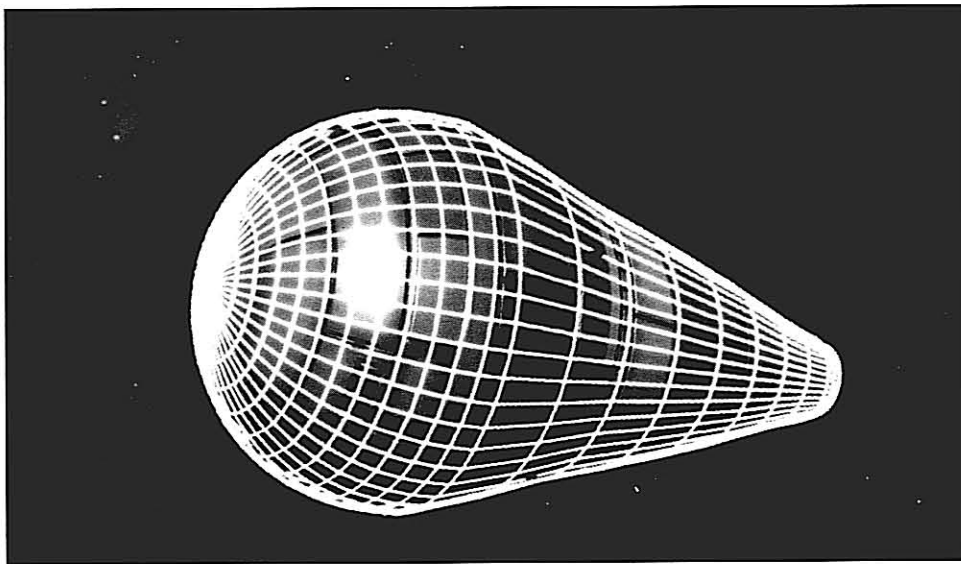
Roll (3d)	Species DX
3 or less	8
4	9
5-6	10
7-8	11
9-12	12
13-15	13
16-17	14
18 or more	15



An animal's Speed score when walking on land is related to its DX and HT scores, although the relationship is not as exact as with human characters. Compute a base value for Speed as $(DX + HT)/3$ for animals with four or more legs, $(DX + HT)/4$ for animals with two or three legs, or $(DX + 4)/8$ for animals with no legs (like snakes or snails). Then choose an actual land-movement Speed. Reasonable values are usually within 2 points of the base value. Large and heavily armored animals tend to move slower, while small animals and carnivores will move faster. Chaser carnivores, and herbivores whose main defense is flight, may move *much* faster (up to about twice the base Speed score).

Animals which swim or fly most of the time will have separate Speed scores for those modes of locomotion. Animals which use wings to fly might have flying Speed equal to about 2-3 times their land Speed. Animals which levitate using a flotation gas or other means will be much slower. Animals such as amphibians which use legs to get around on land will usually be very inefficient swimmers, moving at about $1/4$ their land Speed. Animals which are more optimized for water speed (streamlined body, slimy coat, flippers or flukes rather than legs) will have swimming Speed comparable to the land Speed of a four-legged animal with the same DX and HT.

An animal's Dodge score is equal to half of its most common Speed score or half of its DX, whichever is greater. Some small animals which are well-suited for defense may have an extra point or two of Dodge.



COMPLETING THE DESIGN

At this point, we have all of the information necessary to fill in a standard animal data block:

ST: --	Speed/Dodge: -/-	Size: ----
DX: --	PD/DR: -/-	Mass: ----
IQ: --	Damage: -----	
HT: --	Reach: --	

Collect the results of earlier steps and fill in the fields of the block. At this point, consider what kind of behavior the animal will exhibit. How will it react to humans or other sentient creatures? Is it a good candidate for domestication, does it have any value as a game animal? Does it have any unusual features that would make an encounter memorable to players? One idea is to page through *GURPS Bestiary* or a naturalist's text to see how similar Terran species fit into their environment.

Report

Chandra shifted nervously as he waited. Finally, four senior scouts entered the conference center and seated themselves silently. Chandra reflexively noted the patterns of deferent body language that centered on an elderly man in a plain IISS uniform.

"Go ahead," said one of the new arrivals.

"Thank you, sir," Chandra said, and coughed. After a moment to get a mental grip on himself, he proceeded. "I've been sent to describe several remarkable developments on Carson's World. Our expedition has recently discovered evidence that the Aion species is not extinct, that indeed the Aion civilization may be on the verge of a resurgence."

A tap at the controls of his lectern, and a hologram of two very similar animals appeared above the conference table. "You're doubtless aware of the accidental discovery of what we call beta-form Carson antelope. The alpha-form or original species is a six-legged grazing herbivore, found in large numbers throughout the temperate zone. It is fairly intelligent, probably due to the need for cooperative defense against predators. The beta-form animal is very similar, but the differences have profound implications. Notice that the foremost pair of limbs has been freed by a reconfiguration of the spine. The three-toed hooves found on the alpha form are now three-fingered hands, with fair manual dexterity. Notice also that the cranium is larger and bulges strongly backward, indicating a considerable increase in brain mass."

From the audience: "They look a little like Centaurs. Any chance that this is a lost K'kree colony?"

Chandra smiled. This question he could answer. "No, sir. The resemblance ends with the gross anatomical structure and diet. The beta-form antelope were first sighted as juveniles, living among herds of alpha-form animals. This inspired us to perform a genetic study of the species. What we found is simply unprecedented. The basic repository of genetic information is a DNA variant with no unusual features. The genome, however, is fantastically long. The Carson antelope have over forty times as many base pairs as do human beings. Further, statistical analysis shows that very little of the genome is taken up by unexpressed DNA. Almost all of it is significant information.

Continued on next page . . .

Report

[Continued]

"We have concluded that the Carson antelope is an artificially engineered species. Our speculation is that the Carson antelope are the Aion. The alpha form is one that can survive in a simple animal existence for very long periods of time. The beta form are the sentient Aion. If this is so, then the extra-long genome may encode cultural information, accessible to the sentient Aion at an instinctive level. A kind of racial memory."

"Why do you suppose the beta-form antelope are appearing just now?" asked one of the seniors.

Chandra shrugged. "We don't know. Although we have mapped the antelope genome, we don't yet understand how most of it is expressed. The beta form may be a natural part of the reproductive cycle, although this seems unlikely since we've only sighted it near the expedition's base. Herds far from our camp show no sign of the beta form. Doctor Nuskaldin, our senior geneticist, speculates that the presence of our expedition has somehow triggered the appearance."

This provoked a stir of muttered comments and head-shaking, until the eldest scout raised a hand for silence. "Enough," he said. "Young man, are you aware that I am under pressure from several powerful interests to declare Carson's World open for development?"

Chandra nodded, swallowing sudden apprehension.

"Your expedition has not only found a biological mystery. It has also found large deposits of platinum and industrial-quality gemstones. Would you have me place these riches off-limits?"

Chandra hesitated for only a moment. "Sir, that's your decision to make, not mine. Thankfully. But our recommendation is that you should forbid development, at least temporarily. There are plenty of sources of precious metals and gemstones. If the antelope really are the Aion, then they represent a treasure unique in the Galaxy. At the very least, we can afford to take a few years and be sure."

Sector Scout Leader Anselm hault-Roderic peered intently into the young scout's eyes for a moment, then nodded. "I find I agree with you, young man. When you return, tell your captain that I will contact the Emperor at once."

Example

The GM wishes to design an animal for a woodland environment on the planet Haven. He is trying to fill a carnivore's slot on the appropriate encounter table, and hopes that the animal will prove a challenge to wilderness explorers.

The Type Modifier for the woodland biome is -4, so the GM rolls 2d-4 on the Food Strategy Table for a 5. The animal in question is a scavenger. He rolls 2d on the Social Strategy Table for a 5, finding that the animal has solitary habits. Haven's diameter is 6,300 miles and its atmosphere is of Thin density, so the roll on the Special Features Table is 2d. The GM rolls a 9, so the animal has no special features (in other words, it's a land animal).

The total Size Modifier is -2, from the Biome Table only. The GM rolls a 7, finding that the animal's average mass is 150 pounds (roughly human-sized). He decides that the animal is a trifle stronger than its mass would indicate, and records a ST score of 11. The base number of Hit Points is 10. He rolls 2d on the Animal Build Table for a 10, finding that the species has a Very Robust build. The base HT score is 16, and the final number of Hit Points from the tables is 12. Since this last is between 10 and 20, the GM simply uses the HT score for hit points as well.

The GM then rolls 2d+2 twice on the Animal Weapons Table, getting a 9 and a 12. The animal's main attack mode is a bite with its fangs. Referring to p. B140, the GM determines that the animal's bite does 1d-2 impaling damage. He rolls 3d+1 to determine if the animal has any natural poison or venom, and gets a 12, indicating none. Finally, he rolls 2d+1 on the Animal Armor table, rolling a 12 (but *not* a natural 12, given the modifier). He decides that the animal has Heavy Scales for PD 1, DR 1.

The GM rolls 3d+1 on the Animal IQ table for a 9, and finds that the animal has IQ 4, roughly comparable to a big cat in intelligence. He rolls 3d+1 on the Animal DX table for a 10, so the animal has DX 12. He has already decided that most dominant life-forms on Haven are four-limbed, so the base Speed for the animal is $(16 + 12)/3$ or about 9. Since the animal is fairly large for its environment, and since scavengers don't need a great deal of speed, the GM decides to reduce this value to 8. The animal's Dodge is therefore governed by its DX score and comes out to 6.

The animal's data block looks like this:

ST: 11	Speed/Dodge: 8/6	Size: 1 hex
DX: 12	PD/DR: 1/1	Mass: 150 lbs.
IQ: 4	Damage: 1d-2 imp	
HT: 16	Reach: C	

After thinking about it and checking through the *GURPS Bestiary*, the GM decides that this scavenger is a little like a hyena. It's about the same size, perhaps a little tougher, but slower and more likely to run alone. No one likes hyenas, so this beast is probably not popular either. He decides that it is called a "woods devil" by the people of Haven. It normally avoids humans, although it has been known to attack sleeping or injured woodsmen. It has repulsive dietary habits, an unpleasant appearance, and an uncanny moaning cry. The people of Haven dislike woods devils intensely, and only local environmental law prevents hunters from exterminating the species whenever its range impinges on human territory.



Cultures

WORLD DATA

In this section, we will complete the world-design sequence by developing general information about a world's sentient population.

STEP 19: POPULATION

We will define the *population rating* or PR of a world as the “order of magnitude” of its sentient population. Increasing a world's PR by 1 increases its population by a factor of 10. PR 0 represents a population less than 10, PR 1 represents a population of 10-99, PR 2 a population of 100-999, and so on. We assume that no world may have a PR greater than 10.

The rules in the main text for Steps 20-24 assume that the “mainworld” of the system is being developed. The rules are different for other worlds in the same system (see sidebar). Before going on to the next steps, the mainworld of the system should be designated. This need not require that the entire system be generated in detail. If one world in the system is clearly more hospitable than any others, it can be designated the mainworld.

Procedure

Begin by computing the *maximum sustainable population rating* or MSPR. This represents the number of people the world can sustain without advanced technological support.

If the planet has no atmosphere, an Exotic or Corrosive atmosphere, or an atmosphere at Trace or Very Thin pressure, the MSPR is 0.

Otherwise, the MSPR begins at 9 and is modified if the world is inhospitable for various reasons. Modifiers: -1 for a world of diameter 2,000 - 4,000 miles, -2 for a world of less than 2,000 miles diameter, -1 for hydrographic coverage of 1% to 30% or over 90%, -2 if there is no hydrographic coverage, -1 for a Thin or Very Dense atmosphere, -1 for a Polluted atmosphere, -1 if the world's climate type is Very Hot, Very Cold or Frozen, -2 if it is Uninhabitable (Torrid or Frigid).

Once the MSPR is known, roll 2d-2 to get the actual PR of the world. Modifiers: Add the Resource Abundance Modifier, -1 for every point the MSPR is *less* than 5. The final PR may be greater than the MSPR.

Traveller Note: The original *Traveller* world-design system simply assigned a PR to the mainworld of each star system by rolling 2d-2 with no modifiers for local conditions. If you prefer, use this system to generate PR for your mainworlds, but be aware that it will lead to apparently absurd results (such as unpopulated “garden” planets next door to vacuum worlds with populations in the billions). Of course, the exercise of explaining such odd PR levels may provide the GM with plot hooks. The procedure given in the current rules should be used for secondary worlds of the system.

Expansion From a Center

One possible theme for non-Imperial *Traveller* campaigns is an “age of exploration.” Such a setting involves a homeworld sending out its first expeditions of interstellar exploration and colonization. Nearby worlds may be well-developed, but farther out is the frontier, and beyond that is uncharted space. To generate worlds for such a setting, modify Step 19 as follows.

When planning the campaign as a whole, the GM should choose an “average jump range.” This should be the normal jump capacity for a typical commercial starship, the kind that would try to make a living on speculative trade or carry supplies for a new colony. Jump-2 is reasonable for most *Traveller* settings. Then decide on the “radius of development.” This is expressed in terms of a number of average jumps, within which every world has been thoroughly explored and is being developed as quickly as possible.

When designing a new star system, count the number of “average jumps” it takes to get from the homeworld to the new system. The route chosen must hop from star system to star system, so that none of the “average jumps” ends in deep space. Use the best route possible (which may be rather indirect).



For every average jump in the route beyond the radius of development, apply a -2 modifier to the roll for PR for every world in the system. If the modified roll for a given world is -3 or less, then the world has yet to be thoroughly explored. If this is true for every major world in a star system, then the system as a whole is *uncharted* and must be surveyed and explored from scratch during the course of the campaign.

Mainworlds

The *Traveller* system assumes that every star system has a primary focus of population, a single planet, moon or planetoid belt called the *mainworld*. Any other settlements in the same system are assumed to be dependent on the mainworld for economic support and political control.

Once the population of all worlds has been determined, the mainworld can be designated. The mainworld is always the world with the highest PR. If two worlds have the same PR, the one in the life zone is the mainworld. If none of the candidates are in the life zone (or more than one is) then choose one at random.

The PR for a secondary world must be less than $MPSR + (2 \times (TL - 7))$, where the MPSR is the maximum sustainable PR for the secondary world and the TL is that of the mainworld. The GM may wish to rule out inhabited secondary worlds when the mainworld is at TL6 or less (since interplanetary travel only becomes possible at TL7).

The rules in Steps 20-24 are different for secondary worlds. Once the mainworld of the system has been fully developed, use the following procedures to generate details for any secondary worlds.

Step 20 – Starport Facilities: Port facilities on secondary worlds are generally called *spaceports* to distinguish them from the *starport* on the mainworld. To determine the level of facility available, roll 1d. Modifiers: +2 if the PR is 6 or more, -2 if the PR is 1 or less. The spaceport is Class 0 on a 2 or less, Class I on a 3, Class II on a 4 or 5, and Class III on a 6 or more. A secondary world's spaceport facility may never be better than the mainworld's.

Step 21 – Political Type: If the mainworld of the system has a Captive Government, then so do all secondary worlds. Otherwise, roll 1d. Modifiers: +1 if the mainworld is balkanized. The secondary world's political type is Anarchy on a 1, Corporate State on a 2, Athenian Democracy on a 3, Oligarchy on a 4, or Captive Government on a 5 or more.

Step 22 – Control Rating: Roll 1d. The secondary world's Control Rating is two less than the mainworld's on a 1, one less on a 2, the same on a 3 or 4, one higher on a 5, and two higher on a 6. As always, the minimum CR is 0, the maximum is 6.

Step 23 – Base Technological Level: The secondary world's TL is always one less than the mainworld's.

Step 24 – Unity of Government: For simplicity's sake, we assume that secondary worlds are never balkanized.

Example

Haven's MSPR is 8, with the only applicable modifier being for the Thin atmosphere. The GM rolls 2d-3 (-2, -1 for its Poor resource abundance) and gets 6. Haven has a population in the millions. The GM decides arbitrarily that the exact population is 6 million.

STEP 20: STARPORT FACILITIES

We will assign starports of Class V-I and 0, as in *GURPS Space* (see p. S122).

Procedure

Check for each class of starport in turn, in each case rolling 3d for less than the target number. Place a starport for the first roll that succeeds.

A Class V starport will appear only on a world of PR 6 or greater. Roll 3d for less than (PR + 3).

A Class IV starport will appear only on a world of PR 6 or greater. Roll 3d for less than (PR + 6).

A Class III starport will appear on any world, on a roll of 3d for less than (PR + 9).

A Class II starport will appear on any world, on a roll of 3d for less than (PR + 8).

A Class I starport will appear on any world, on a roll of 3d for less than 15.

If no Class I-V starport is present on a world, the starport will automatically be of Class 0.

At this point, the GM may want to decide whether the world has been declared an Amber or Red Zone. This should be normally be done according to the campaign situation, but if you want a random determination, roll 3d. Modifiers: +4 if the world has a Class 0 starport. On a 13-16 the world is an Amber Zone, on a 17 or more it is a Red Zone.

Traveller Note: The original *Traveller* world-design system assigned starports without reference to the population of a world. To mimic this pattern, roll 2d on the Starport Class Table if the world being generated is the mainworld of the star system. Otherwise, follow the above procedure, except that no secondary world may have better facilities than the main world.

Secondary worlds will only have port facilities on a random die-roll if they are populated (the GM is free to deliberately place a port on an uninhabited world if he has some reason to do so).



Starport Class Table

Roll (2d)	Starport Class
2-4	V
5-6	IV
7-8	III
9	II
10-11	I
12	0

This procedure will cause some high-population worlds to have primitive facilities or none at all, while some frontier worlds have Class V starport facilities. Explaining why such combinations occur is up to the GM. Perhaps the high-population world has deliberately shut itself off from interstellar trade for cultural reasons, or the frontier world has a major port because of its strategic location.

Example

The GM decides to use the main procedure to generate Haven's starport facilities. The planet has PR 6, so the target numbers are 9, 12, 15 and 14. The GM rolls a 12, 13, and 10, so Haven has a class III port or "local facilities."

STEP 21: POLITICAL TYPE

The political type of a world indicates the kind of social and political structure that is most prevalent there. It does not necessarily indicate that there is only one local government (see Step 24). We will generate political types to match, as closely as possible, the world government types used in *Traveller*.

Note that the political types generated here are most appropriate for *human* societies. As always, nonhuman aliens may develop very different approaches.

Procedure

Determine the dominant political type by rolling 2d-7 on the Political Type Table. Modifiers: add the world's PR. Record the final dice roll result as well, for use in Step 22.

Political Type Table

Roll (2d-7)	Political Type
0 or less	Anarchy
1	Corporate State
2	Athenian Democracy
3	Oligarchy
4	Representative Democracy
5	Technocracy
6	Captive Government
7	Balkanized
8	Meritocracy
9	Bureaucracy
10-11	Dictatorship
12	Oligarchy
13 or more	Theocracy

Several results require explanation, or have slightly different meaning here than they do in *GURPS Space* (see pp. S119-S122).

True *anarchy* is fairly rare, and usually represents a society in a state of collapse. If an Anarchy is rolled, roll 1d: on a 2-6 the society is Clan/Tribal instead.

An *oligarchy* is a "special condition" under the rules in *GURPS Space*. In this case, it indicates that no matter what the nominal form of government, real power is in the hands of a small, self-perpetuating elite. An oligarchy may be based on a hereditary aristocracy of some kind. Roll 1d: on a 4-6 the society is Feudal instead.

A *technocracy* represents what *Traveller* calls a "feudal technocracy." This form of government is common in the Third Imperium. In it, government is indeed carried out by technical experts, but these experts are regarded as an aristocracy and given the titles and privileges of nobility.

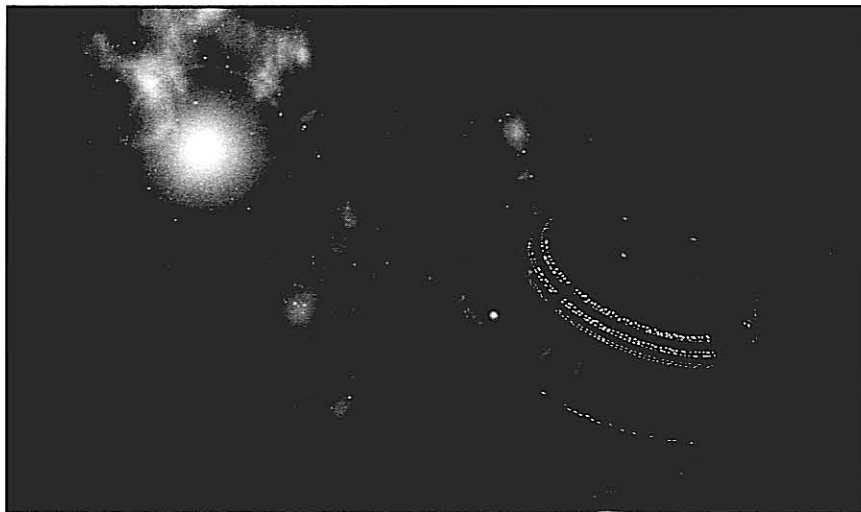
A *captive government* represents a society which is ruled from elsewhere. This may represent a colony, a military government, or a subjugated society. The GM should decide which is applicable, based on the situation in his campaign.

If a result of *balkanized* comes up, then the world is automatically divided among multiple societies (see Step 24). Re-roll to determine the most common political type on the world, ignoring further results of "captive government" or "balkanized."

Bases

There may be several different facilities present on any mainworld, associated with the local or Imperial government.

Naval Base: The Imperial Navy will maintain a base in the system if the mainworld starport is Class V or IV, on a roll of 2d for 8 or more. At his discretion, the GM may designate a naval base as an Imperial Naval Depot, a major center of military shipbuilding and supply. Depot systems are usually chosen for their strategic location. There is normally only one per sector.



Scout Base: The IISS will maintain a base in the system if the mainworld starport is Class II or better. Roll 2d for 10 or more to place a scout base. Modifiers: +2 if the mainworld starport is Class III, +1 if it is Class IV. Scout bases which fall on the express-boat routes may actually be IISS Way Stations, with extensive facilities for the repair and maintenance of IISS ships. Way stations should appear about one per subsector. IISS bases are never established in the same system as an Imperial Navy depot.

Military Base: A local military base may be present in the system if the mainworld starport is Class III or better. Such a base is associated with a powerful world, a group of worlds, or a subsector. It acts like an Imperial Navy or IISS base, supporting local military forces. Roll 2d for 10 or more to place a military base. Modifiers: +1 if the mainworld's PR is 8 or more, +2 if the mainworld starport is Class III, +1 if it is Class IV, -2 if an Imperial naval or scout base is already present in the system.

Continued on next page . . .

Bases

[Continued]

Imperial Research Station: A research station can be placed on almost any world. Roll 3d for 17 or more to place a research station, or the GM may arbitrarily place them (about one in every other subsector). Research stations are named on a sector basis, using Greek letters (i.e., the first station in a sector is Research Station Alpha, the second Beta, and so on). When a station is closed permanently its letter becomes available again.



Determining a UWP

Classic *Traveller* used an eight-part code to represent the mainworld of each system: the Universal World Profile or UWP. For those who wish to use the world-design systems in this book in their Classic *Traveller* campaign, we offer the following guidelines for converting world descriptions to the UWP.

The first entry in the UWP represented the system's starport facility, and fell in the range A-E (with X for interdicted worlds). Use the mainworld's starport class and the Starport Equivalents table on p. GT123 to get this entry.

Continued on next page . . .

A *meritocracy* or a *bureaucracy* is also a "special condition" in *GURPS Space*. Again, another government type from the table may nominally be in charge, but real power is wielded by a collection of bureaucratic agencies. A Meritocracy represents what *Traveller* calls a "civil-service bureaucracy," in which government agencies hire individuals for their expertise. A Bureaucracy represents an "impersonal bureaucracy," in which the governing agencies are no longer responsive to the people, and in which entry to government service may no longer be purely by competence.

Example

A roll of 2d-1 (-7, +6 for the world's PR) yields a 7. Haven is balkanized. The GM rolls 2d-1 again, getting a 6 but ignoring the "captive government" result. A third roll of 2d-1 gives a 3, so the planet's most common political type is Oligarchy.

STEP 22: CONTROL RATING

The local Control Rating represents the level of legal control that visitors to the planet are most likely to see. Police and court mechanisms may work very differently away from the startown, or for natives of the world.

Procedure

Roll 2d-7 on the Control Rating Table. Modifiers: add the modified final dice roll made for Political Type in Step 21.

Control Rating Table

Roll (2d-7)	Control Rating
0 or less	0 (effective anarchy)
1-2	1 (very free)
3-4	2 (free)
5	3 (moderate)
6-7	4 (controlled)
8	5 (repressive)
9 or more	6 (totalitarian)

Example

Turning to the Control Rating Table, the GM rolls 2d-4 (-7, +3 for the final dice roll result from the political type determination). The result is a 4, so Haven's usual Control Rating is 2.

STEP 23: BASE TECH LEVEL

A world's *base tech level* is the level of technology that the world's population most commonly uses *and* can produce for itself with local skills and resources. A more detailed technological description can be generated using rules later in this chapter.

Procedure

Begin by computing the minimum TL required by the world's environment and population. If the world's PR is less than or equal to its MSPR, then the minimum TL is 0. Otherwise, it is equal to 6 plus half the difference (PR minus MPSR), rounded down.

Roll 1d on the Tech Level Table to determine the actual TL. Modifiers: +6 if a Class V starport is present, +4 for a Class IV starport, +2 for a Class III starport, -4 for a Class 0 starport, +1 if the planet is less than 4,000 miles in diameter, +1 if there is no atmosphere, +1 if the atmosphere is Exotic or Corrosive, +1 if the atmosphere is Hospitable or Polluted but has Trace or Very Thin density, +1 if the hydrographic coverage is 85% to 94%, +2 if the hydrographic coverage is 95% or higher, +1 for PR of 1-5, +2 for PR 9, +4 for PR 10, +1 for a political type of Anarchy or Technocracy, -2 for a political type of Theocracy.

Some results require a second roll of 1d on the Low Tech Level Table. The actual TL is the result from the tables or the minimum TL computed above, whichever is greater.

Tech Level Table

Roll (1d)	Tech Level
0 or less	0
1	Roll on Low TL Table
2	4
3-4	5
5-6	6
7	7
8	8
9-11	9
12-13	10
14	11
15	12
16 or more	13+

Low Tech Level Table

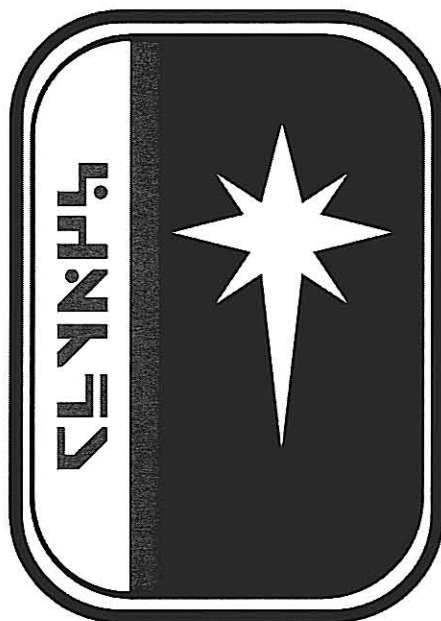
Roll (1d)	Tech Level
1-2	1
3-4	2
5-6	3

In the Third Imperium setting only a very few societies have TL higher than 12, and those societies have very limited scope. Results of TL13 or higher should normally be re-rolled. The GM may deliberately choose to have an ultra-tech world present in his campaign, of course. Other settings may have different maximum TL, as defined by the GM.

Traveller Note: The procedure above follows the original *Traveller* rules closely. Under that system, however, there was no consideration of minimum TL as such (although inhospitable worlds tended to get higher TL via the die-roll modifiers). If you want to mimic the original system exactly, simply ignore the minimum-TL computation. This may give rise to situations where a world's population can't sustain itself using local technology. This may indicate that the world is dependent on offworld trade or imported technology to sustain its population. Or (if the Area Tech Levels rules below are used) perhaps the local society is more advanced in environmental technology than in other sectors.

Example

Haven's PR is less than its MSPR, so there is no minimum TL. The GM rolls 1d+2 (+2 for the Class III starport) and gets a 4. Haven has a base TL of 5, roughly equivalent to Earth's early industrial period. The GM decides that the inhabitants are members of a "back-to-nature" movement, who have settled the planet to enjoy a low-technological lifestyle. The planet name that he chose at random earlier is now beginning to seem appropriate . . .



Determining a UWP

[Continued]

The second entry represented the size of the mainworld. If the mainworld is a planetoid belt or a world whose diameter is less than 500 miles, then this entry is 0. Otherwise, round the mainworld's diameter to the nearest thousand miles, then divide by 1,000 to get the second entry.

The third entry represented the planet's atmosphere type. If the mainworld has no atmosphere, this code is 0. If it has a Trace atmosphere, the code is 1. If the atmosphere is Exotic, the code is A. If the atmosphere is Corrosive, the code is B (or C for very extreme cases). Otherwise, if the atmospheric pressure is less than 0.43 standard, the code is 3 (if Hospitable) or 2 (if Polluted). If pressure is between 0.43 and 0.7 standard, the code is 5 (if Hospitable) or 4 (if Polluted). If pressure is between 0.71 and 1.49 standard, the code is 6 (if Hospitable) or 7 (if Polluted). If pressure is 1.5 standard or higher, the code is 8 (if Hospitable) or 9 (if Polluted).

The fourth entry represented the mainworld's hydrographic coverage. Round the hydrographic coverage to the nearest 10%, then divide by 10% to get the entry.

The fifth entry represented the mainworld's population. It is exactly equal to the PR as generated in the main rules here.

The sixth entry represented the government type of the mainworld. If the mainworld is balkanized, this code is 7. Otherwise use the Political Type generated here, refer to the Government Equivalents table on p. GT123, and choose a *Traveller* government type that fits.

The seventh entry represented the "Law Level" of the mainworld. It was effectively equal to the 2d roll on the Control Rating Table in these rules. Alternatively, take the mainworld's Control Rating, refer to the Law Level Equivalents table on p. GT123, and choose a *Traveller* law level that fits.

The eighth entry represented the "Tech Level" of the mainworld. It was essentially equal to the modified 1d roll on the Tech Level Table in these rules. Alternatively, take the mainworld's *GURPS* Tech Level, refer to the sidebar on p. GT107, and choose a *Traveller* Tech Level that fits.

Resources

The best book on the design of cultures for science fiction is *Aliens and Alien Societies*, by Stanley Schmidt.

Good undergraduate-level texts in anthropology and political science will be helpful when working on the design of local cultures. One anthropologist who has written extensively for the popular market is Marvin Harris. We recommend his book *Our Kind* as a good layman's introduction to the subject. Be aware that some anthropologists disagree with Harris' philosophical biases, and some of his views are controversial.

Certain specialized branches of knowledge will be particularly useful. For example, *ethnography* is a branch of anthropology which deals with the direct observation of a society and its cultural systems. Ethnographic studies are priceless to us as world-builders, because they provide detailed information on societies which are completely human and yet are very different from our own.

Sociobiology is a relatively new field of study, which tries to explain the social behavior of humans and other animals in terms of evolutionary biology. It will be useful to worldbuilders who want to deduce the cultural behavior of *alien* sentient species from their biology. The most important book on the subject is E. O. Wilson's *Sociobiology: The New Synthesis*. Wilson's more recent books *On Human Nature* and *Consilience* are also of interest. Another writer who is more accessible to the layman is Desmond Morris, whose most popular books are *The Naked Ape* and *The Human Animal*.

Meanwhile, many *Traveller* GMs will want to develop interesting local customs without delving into the arcana of the social sciences. For them, a superb resource is widely available: travel guides! These often include considerable information about what is considered polite (and what isn't) in various cultures. One good example is the *Customs and Manners* series, by Nancy Braganti and Elizabeth Devine. Naturally, the cultures covered tend to be those of the more developed Terran nations of the late 20th century, but the GM can easily use them as inspiration for cultures of the Third Imperium . . .

STEP 24: UNITY OF GOVERNMENT

A world's political type doesn't always represent a single government over the entire population. Many worlds, especially at low levels of technology, are *balkanized* or divided among a number of governments. In this case, the overall political situation may fall into several categories.



Procedure

Roll 2d on the World Government Table. Modifiers: subtract the planet's PR and add its base TL. If the results of Step 21 require that the world be balkanized, then the maximum result of the dice roll is 7.

World Government Table

Roll (2d)	Political Situation
5 or less	Diffuse
6	Factionalized
7	Coalition
8 or more	World government exists

In a *diffuse* situation, there are dozens or even hundreds of petty tribes, clans, nations or groups. The starport, if it exists, rests in the midst of a number of local governments which may change over time. In this case, the political type generated will be the most common one in force in the area of the starport. The average PR of any one political unit is equal to the world's PR, minus 2.

In a *factionalized* situation, there are perhaps a dozen major governments (roll 3d) which divide control of the world between them. These governments are probably in constant competition, engaging in political scheming and open warfare. The planet's main starport will probably be in the territory of one major government, whose political system will be represented by the generated political type. Other governments may vary widely. The average size of a political unit is equal to the world's PR, minus 1.

A *coalition* system resembles a factionalized situation, but in this case a few of the world's most powerful societies (roll 1d to see how many) dominate affairs and tend to present a united front to outsiders. Competition is kept within limits that are more-or-less clearly defined, so that no outside force or minor nation can upset the balance of power. The starport may again be within the territory of one powerful society, or it may be in a neutral area with security guaranteed by the entire coalition. In this case, the political type generated is the one most common for members of the coalition. The average size of a political unit is equal to the world's PR, minus 1 (in some cases, the largest political units may have PR equal to that of the world).

Traveller Note: The original world-design system for *Traveller* did not determine unity of government separately from political type. In that system, a result of "balkanized" for political type was sufficient. The current rule is designed to add nuances to the concept of balkanization. It also reflects the fact that low-technology cultures have more difficulty bringing large populations under a single government. If the GM wishes, he may simply skip Step 24 and allow Step 21 to determine whether a world is balkanized or not.

Example

The GM rolls 2d+1 (-6 for the PR, +5 for the TL) and gets a 7 (which is the maximum allowable result anyway, since the political type roll forced a balkanized result). Haven is ruled by a coalition of several major states.

POPULATION CENTERS

In our discussion of population centers, we will often refer to the PR of a city. This means the same thing for cities as it does worlds – it indicates the “order of magnitude” for the city’s population.

A Brief History of Cities

An urban center requires some amount of agricultural hinterland to keep itself fed. The size of cities, therefore, depends on the available technology. Improved agriculture can lead to greater food yields per acre, improved transportation can make it easier to bring food into the city, improved social institutions can lead to more effective administration of masses of people.

Cities based on a primarily agricultural economy can grow to about PR 5. The occasional city at low-end PR 6 is possible without industry, but it requires massive imports of food from outlying regions. Such cities are almost always the capitals of large states.

Cities of PR 6-7 normally require the mechanized agriculture and improved transportation that come with an industrial economy. The industrial city reaches its height as some individual cities grow to PR 7. Another PR 7 city type is the *megalopolis*, which happens when several smaller cities sprawl far enough to meet each other along highway or rail lines.

Larger urban populations are possible. An *arcology* is a nearly self-contained city housed in a single huge building. Theoretically, arcologies can use fusion power and recycling technology to allow unprecedented population densities, reaching PR 8. Finally, the ultimate in city development comes when gravitic technology allows buildings to ignore the drag of gravity. The soaring spires and floating buildings of gravitic architecture allow individual cities of PR 9, although such incredible crowding is almost never necessary.

Assuming an economic base that is typical for human civilizations, the maximum PR for cities should follow the City Size Table.

City Size Table

Tech Level	Max PR	Examples
0 (late)	3	Jericho, Uruk, Eridu
1	4	Memphis, Babylon, Nineveh
2-4	5	Alexandria, Antioch, Rome, Baghdad
5-6	6	London, New York, Tokyo
7-8	7	Boston-Washington, Mexico City, Shanghai
9-10	8	(Arcology cities)
11 or higher	9	(Grav cities)

Mapping Cities

On most worlds, the largest cities will have PR equal to two less than the world’s PR or the maximum PR for that Tech Level, whichever is less. There will normally be about 1d+3 of such cities, with the rest of the population living in smaller urban centers and in the countryside. On an Earthlike world, these major cities will almost always appear in Mixed terrain, along important rivers or coastlines.

One variation on this pattern appears when a world is economically undeveloped, or when it has just been colonized. In such cases, there is usually a single dominant or “primate” city, which incorporates almost all commercial and industrial activity. Any other urban centers will be quite small. The GM should consider applying this pattern on any world that he considers to be still in the process of economic development.

Rhylanor (V)

From published material, we know that Rhylanor has a PR of 9 and an actual population of about 8.3 billion. Checking the planet’s MSPR, we find that (due to its Very Thin atmosphere) the maximum sustainable PR is 0. This isn’t a paradox – it simply means that Rhylanor’s population is dependent on some kind of high technology to survive. Presumably the planet’s billions live in domed or underground cities.

We already know that Rhylanor has a Class V starport and plays host to Imperial naval and scout bases. We also know that its political type is Oligarchy, and *Behind the Claw* states that the government is by a hereditary aristocracy. Perhaps Rhylanor is one of those worlds where the Imperial nobility plays an important or even dominant part in local government. The listed Control Rating for the planet is 3.

Given Rhylanor’s MSPR and PR, we can set the minimum TL for the planet at 10. The published TL for the planet is 12, so we can be certain that the local population is able to maintain its environment using local expertise and resources.

Published information about Rhylanor doesn’t indicate that the world has divided government. This is reasonable, since the roll on the World Government Table would be 2d+3 (-9 for PR, +12 for TL). Even if we were to determine Rhylanor’s unity of government randomly, odds are it would be unified.

This completes the development of a detailed world description for Rhylanor. This should demonstrate how the application of world-building techniques can add considerable new color to existing *Traveller* material.

We always knew Rhylanor as the homeworld of Olav hault-Plankwell, first of the Emperors of the Flag. Now we have some insight into the harsh world he grew up on. The looming reddish sun makes its way through the sky very slowly, baking the surface during the long days; lengthy nights freeze the surface. The temperature extremes and thin atmosphere are likely to kill anyone caught without life-support gear on the surface. A few hardy native life-forms exist, analogous to lichen or bacterial mats, clinging to the naked rock or swimming in the shallow seas. The upper classes live in domed cities, while the bulk of the population huddles in vast underground warrens. The world is a prosperous hub of trade and high-tech industry, although it has few unusual natural resources of its own. Millions of visitors come each year to the city once dominated by the Plankwell family, where today a monument to the clan’s most famous member stands in the dim noon light...

Local Customs

Most people who briefly visit a culture other than their own never reach a deep understanding of all of that culture's customs and rituals. Similarly, *Traveller* players will rarely need much detailed information about local customs. The GM can usually develop a few distinctive customs for any given world to be visited, bringing them into play to give his players some "flavor" for the alien society. Of course, developing a few distinctive customs may also give the GM tools to challenge his players. Adventurers who run afoul of cultural "land mines" will soon learn to inquire about local customs ahead of time!

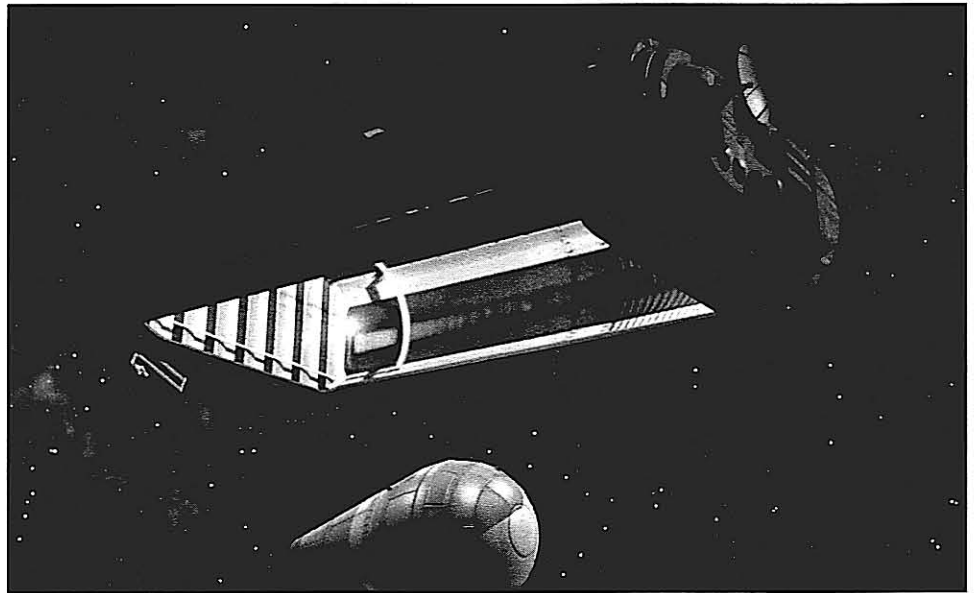
One way to proceed is to consider a few *cultural universals*. Anthropologists have long recognized that every human culture develops some response to each of a number of universal concerns. The details differ from society to society, but every culture addresses these issues. The GM can choose a few of these and use his imagination to develop unique local customs that his players will long remember. Specific cultural universals are discussed in sidebars throughout this chapter.

When designing customs for a strange human society, consider investigating known cultures from Earth's history, *as different from your own as possible*. You'll find plenty of inspiration for your own alien cultures, all the more useful since you will know that real people lived under similar customs.

Naturally, the cultural universals are probably only "universal" in *human* cultures. Even so, the GM developing cultural traits for a nonhuman civilization can still use these universals as a point of departure for his own thinking. Suppose the aliens have a different reproductive pattern than humans do? They will still structure their reproductive activity through cultural values and customs. What does the difference in biology imply for sexual taboos, family patterns, rules of inheritance? Even if an alien species simply doesn't have one of the human cultural universals, that fact will suggest something about the aliens' mindset that the GM can use. Besides, perhaps the aliens have cultural universals, rooted in their different biology, which humans don't have and can't easily understand...

On high-population Earthlike worlds, the GM may wish to mark some "urban terrain" on the planetary map. This represents regions of the planet that are heavily built-up, with many small urban centers and a population of at least 1,000 people per square mile. Urban terrain should almost always replace Mixed terrain near water, as for the planet's largest individual cities. Assume that there are about 1d-2 Urban hexes (minimum 0) per billion people living on the planet. The world's major cities should be placed in Urban terrain.

One more feature that should appear on almost any planetary map is the world's main starport. This should be placed in Mixed terrain, preferably near the equator and as close to the world's major cities as possible.



SOCIAL PARAMETERS

Societies of intelligent beings are the most complex systems in the known universe. This book will present no single set of rules for detailing a society. Instead, there are a number of tools that can *optionally* be used to flesh out alien cultures.

We can describe societies in terms of a eight "social parameters." These represent general tendencies in a society's worldview. Such a description will naturally simplify the true situation drastically, but it should allow GM and players to grasp a culture's general flavor.

Procedure

For each of the eight parameters, roll 3d on the Social Parameters Table. Apply any listed modifiers.

The modifiers will sometimes refer to conditions on a given world. If the society inhabits and controls a single world, use that world's characteristics (its population, assigned political type, Control Rating, and so on). If the society shares the world with others, use the characteristics specifically associated with the society rather than of the entire world. If the society covers multiple worlds, use the characteristics of its homeworld or most important world. The GM should use his discretion when determining parameters for societies that don't seem to fit any of these patterns.

Further, each parameter is tied to one of the sets of "personality traits" that can be used in designing alien racial templates (see *GURPS Uplift* or p. CI180). The eight parameters can thus be used to generate cultural profiles for non-human societies.

Record the resulting parameter level. Extremes of each parameter will have descriptive adjectives attached, which can be used to portray the society in intuitive terms. Each parameter level will also have an associated Skill/Reaction Modifier. If the GM wishes, he may apply this modifier to certain die rolls when adventurers are interacting with the culture in question.

Social Parameters Table

Roll (3d)	Level	Skill/Reaction Modifier
5 or less	Low	-3
6-7	Low	-2
8-9	Moderate	-1
10-11	Moderate	+0
12-13	Moderate	+1
14-15	High	+2
16 and up	High	+3

"The old Imperial strategy of a "crust defense" has proven unworkable. Instead, the bulk of the Imperial Navy now operates as a strategic reserve, relying on colonial forces to delay the first blow of any attacker. Such a strategy requires advance warning and quick response. IISS intelligence and covert operations have therefore expanded considerably in the last fifty years."

– J. Edward Zowdrani, Intelligence Office

PLURALISM

Societies are not always unified. Members of a society may differ in ethnic background, and may have varying notions about moral principles, laws, religious beliefs, political ideologies, scientific theories, even styles in art or architecture. The Pluralism parameter describes how divided the society is with respect to these core ideas.

Modifiers: +2 if the society is in contact with many different other societies (as on a balkanized world). +2 if the society has CR 0, +1 for CR 1, -1 for CR 5, and -2 for CR 6. +2 if the beings making up the society have Reclusive, +1 if they have Loner, -1 if they have Chummy, -2 if they have Gregarious.

High Pluralism (Diverse): The society is fragmented along cultural lines. No set of cultural values can be considered dominant. Internal conflict may be common, or the society may have developed ways of mitigating the clash of cultural values.

Moderate Pluralism: One "majority" subculture may be considered dominant, possibly for historical reasons. Even so, a number of distinct worldviews are present within the society. There is dissension on many issues.

Low Pluralism (Monolithic): The society is dominated by one set of cultural values. Cultural minorities may exist, but they are always under pressure to conform to majority expectations. Individual members of society may be punished if they deviate publicly.

Applications: Apply the Pluralism modifier whenever characters need to deal with dissension and diversity within local society. For example, the GM can add the modifier to any Reaction roll when an adventurer publicly challenges the core values of a local culture. Or the modifier can be added to the effective skill level when PCs are working to locate, contact or even create a dissident group.

Contact

One day, the Aion came down from the hills.

They weren't unexpected. Small bands of Aion had been approaching for some time, finding good vantage points from which to observe human activity. When these Aion crossed the security perimeter and showed no sign of stopping, Administrator Ral Chandra was ready to meet them.

Chandra remembered the day he had been one of the first two men to stand on Carson's World, half a lifetime ago. His career had taken him to a dozen worlds, but he had leaped at the chance for another posting to the Aion homeworld. How better to find out how the story would end?

The Aion cantered directly toward the administration building, which might have been coincidence but might also have revealed something about their grasp of human nature. Chandra and his staff intercepted them, unarmed and empty-handed. One of the Aion carried a wooden staff, others had wide-bladed iron knives, but none made a threatening movement. Human and Aion watched each other calmly, waiting.

The first Aion finally stepped forward, speaking briefly in a deep and gravel-filled voice. For a moment, Chandra caught none of the meaning, but then his training reasserted itself. "What kind are you?" the Aion had asked.

"We are human," Chandra replied, stumbling only slightly over the phonemes of Aion language.

"Human," the Aion mused. "We do not remember you. The stream-of-stars must have changed much while we slept."

Chandra made the hand-gesture that corresponded to a nod.

"How wide is your understanding?" the Aion asked. "Do you know how long it has been, how long we slept, how long we dreamed in animal innocence?"

"Not precisely," Chandra replied. "Your ancestors cleared away signs of their presence with great care. It may have been as long as a million years."

The Aion all made the nod-gesture, unsurprised.

"If I may inquire," said Chandra, "why did your people enter the period of animal existence?"

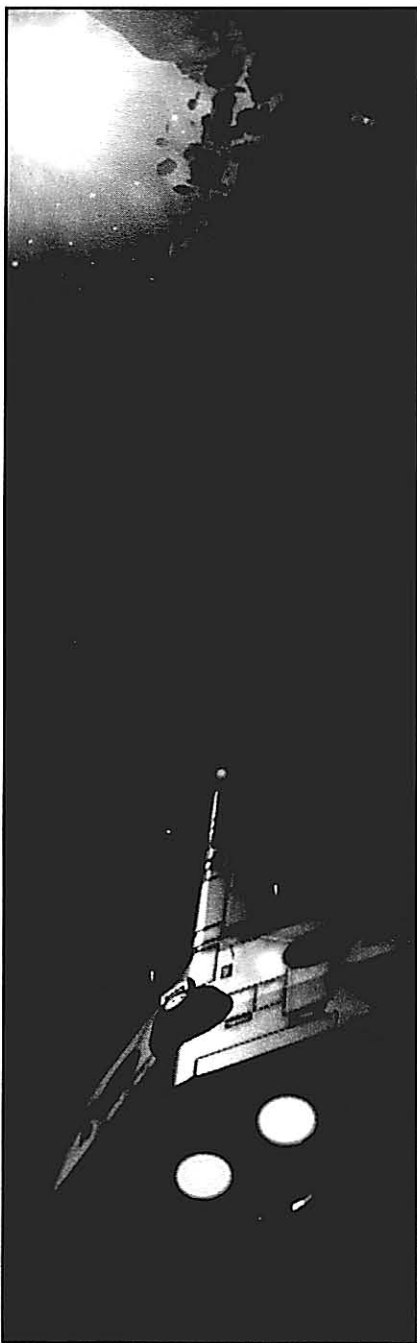
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Contact

[Continued]

"It is not forbidden knowledge," said the leading Aion. It gestured with its staff at the sky, the sun, the round limb of Primary. "When first we moved among the stars, there was no one else. There were only animals who had not yet learned the arts of speech, of fire, of starships. We are not beings who can long tolerate being alone. After a time, we chose to return to the life of our distant ancestors, waiting for the time when someone would come to find us. Now you have."

Chandra nodded gravely. "Now we have, and you are very welcome among us."



TOLERATION

Societies vary in the degree of tolerance they display toward foreigners and foreign ideas. Some societies prefer to close themselves off from outside influence. Others may welcome exotic ideas. Naturally, a tolerant society is more likely to welcome visitors or immigrants.

Modifiers: +2 if the society is Diverse, -2 if it is Monolithic. +2 if the society's main world has a class V starport and is not interdicted, +1 if class IV and not interdicted, -1 if class I or 0 and not interdicted, -2 if the world is interdicted. +2 if the beings making up the society have Strong Xenophilia, +1 if they have Xenophilia, -1 if they have Racial Intolerance, or -2 if they have Xenophobia.

High Toleration (Cordial): Foreigners and foreign ideas are actively welcomed. Members of the society tend to be curious, willing to hear what foreigners have to say even if they don't agree. In extreme cases, foreigners may find themselves idolized.

Moderate Toleration: Foreigners are accepted to some extent, although they are expected to obey local laws and respect local customs. Members of the society tend to regard their own society as superior to others. Foreign ideas are accepted or rejected on their merits, as long as they are not disruptive.

Low Toleration (Xenophobic): The society fears and distrusts foreigners. Foreign ideas are rejected out of hand as foolish and dangerous. If foreigners visit the society, their movements may be restricted for their own protection.

Applications: The Toleration modifier comes into play whenever a character is clearly foreign to the local culture. Add the modifier to any Reaction roll when a character's foreign origins or customs are obvious. Or add it to effective skill level when a foreigner tries to explain his own culture or motivations to locals.

SOLIDARITY

This parameter measures the relationship that the society expects between the individual and the group. Some cultures put great emphasis on private action and responsibility, while others submerge the individual into his social allegiances.

Modifiers: +2 if the society has over 1 billion members, +1 if it has between 100 million and 1 billion members, -1 if it has between 1 million and 10 million members, -2 if it has less than 1 million members. +2 if the beings making up the society have Hive Mentality, +1 if they have Selfless, -1 if they have Selfish, -2 if they have Self-Centered.

High Solidarity (Collectivistic): Altruism is a strong cultural value. Members of the society routinely try to help others, even at cost to themselves. Social leaders can easily mobilize large numbers of people to work toward collective goals. Economic competition is kept under strict control, either by government action or by social pressure.

Moderate Solidarity: Members of the society exhibit altruistic behavior at specific times (for example, when conditions are difficult). They tend to look out for themselves otherwise. Leaders find it difficult to muster support unless there is a clear need. Economic competition is common and only lightly restricted.

Low Solidarity (Egoistic): Members of the society rarely sacrifice themselves for others. Altruism may be regarded as a foolish or weak attitude. Collective action is very difficult to bring about unless force is applied. Economic competition is very common and can be cut-throat in nature. Lower social classes may be ruthlessly exploited.

Applications: The Solidarity modifier can be added to Reaction rolls involving “requests for help.” It can also be added to effective skill when using Leadership or other social skills to call for collective effort.

TRACTABILITY

This parameter measures how easily the society is governed, how much effort the society’s political leaders must exert to maintain order and control.

Modifiers: +2 if the society is Collectivistic, -2 if it is Egoistic. +2 if the local government type is Caste, Dictatorship, Feudal or Theocracy, +2 if it is Corporate State or Oligarchy, -1 if it is Athenian Democracy, or -2 if it is Anarchy or Clan/Tribal.

High Tractability (Submissive): The society is easily governed. The people obey the laws without much complaint, and work within established channels if they must press for change. The society is very stable.

Moderate Tractability: The society’s leaders must sometimes use persuasion or force to keep its members in order, but open rebellion is rare. Complaints about the law reach the level of civil disobedience or personal rebellion.

Low Tractability (Rebellious): Members of the society resent authority, and are likely to rebel as soon as they disagree with established laws or policies. In aggressive societies, armed revolt is always a possibility. The society is unstable.

Applications: Use the Tractability modifier whenever dealing with rebellion against authority. The modifier could be added to Reaction or social skill rolls when appealing to people to “work through channels,” or subtracted when trying to encourage defiance of authority figures.

AGGRESSION

This parameter measures the attitude of the society’s members toward violence. It also offers insight into how cultural norms are enforced within the society.

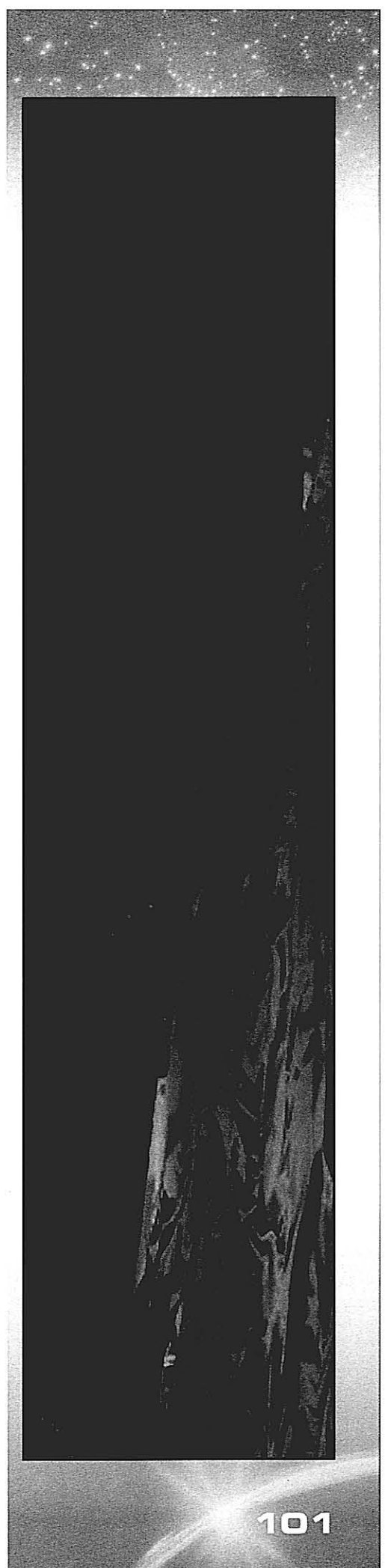
Modifiers: +2 if the society is Rebellious, -2 if it is Submissive. +2 if the local CR is 0, +1 if CR 1, -1 if CR 5, -2 if CR 6. +2 if the beings making up the society have Solipsist, +1 if they have Callous or Oblivious, -1 if they have Sensitive, -2 if they have Charitable.

High Aggression (Violent): Violence is a common method for resolving disputes in the society. In extreme cases, violence may be the preferred response to any problem. Social norms are likely to be imposed by naked force, whether or not they also have the weight of custom.

Moderate Aggression: Social and cultural forces exist to restrain violence. When resolving disputes, members of the society will tend to try diplomatic methods first. The use of force may be reserved to certain institutions or social classes. Social norms are enforced through the rule of custom or law, backed by the threat of violence.

Low Aggression (Pacifist): Violence is regarded as an aberration, to be used in the last resort if at all. Members of the society may prefer to leave a dispute unresolved, or accept an unsatisfactory result, rather than use force. Social norms are enforced through the force of custom, possibly with an elaborate code of shame, so that violent force is seldom needed.

Applications: The Aggression modifier can be subtracted from any Reaction roll in a “potential combat situation.” It can also be subtracted from die rolls for morale checks. On the other hand, the modifier can be added to Leadership skill when in a combat situation, or to social skills when trying to whip people into a violent response.



Kinship

Every human society develops its own rules of kinship, recognizing what relationships exist between people based on marriage or descent. Some individualistic societies make very little of such relationships, so that people not in the same immediate family will behave almost like strangers. Other cultures, however, place considerable importance on kinship. Such societies form *descent groups*, whose members share resources and support one another out in the society at large.

Humans have evolved a wide range of rules for deciding who is related to whom. Some cultures trace descent only through the male line, a system called *patrilineal descent*. For example, most Americans and Europeans use patrilineal reckoning with their "family name." This name is inherited from the father, while wives take their husband's family name. The complementary system is called *matrilineal descent*, and indicates that descent is traced only through the female line. The third major system is called *cognatic descent*, indicating that kinship can be reckoned through a combination of male or female links, depending on the situation. Some cognatic societies use patrilineal kinship for some social purposes and matrilineal kinship for others. In other cognatic societies, group membership may depend on which set of relatives one lives with, or simply on the choice of the individual.

Another important concept which affects kinship is the question of residence. When a marriage takes place, who do the newlyweds live with? In *patrilocal* societies, the wife moves in with her husband's family, while in *matrilocal* cultures the husband moves to live among his wife's kin. Most other societies allow newlyweds to live where they want to, choosing which set of relatives to live among or setting up a new household elsewhere. A very few cultures use *natolocal* residence, in which husbands and wives remain in their birth households and simply visit one another.

"What amazes me is how the same problem is solved in the same way by so many different cultures..."

— Ravi Shah,
Exploration Office

PRAGMATISM

This parameter describes the methods normally used by members of the society to gain greater understanding of their environment. It indicates whether the society is likely to take an experimental, scientific approach to knowledge, or is more likely to seek understanding through revelation.

Modifiers: +2 if the society's most common Tech Level is 6-8, +1 if it is 5 or 9, -1 if it is 2-3, -2 if it is 0-1. +2 if the beings making up the society have Hidebound, +1 if they have Dull, -1 if they have Imaginative or Versatile, or -2 if they have Dreamer.

High Pragmatism (Empirical): The society puts the most emphasis on observation, experimental evidence and methodical inquiry. Intuition and revelation are not valued as sources of understanding. There may be a rigid framework of knowledge that cannot be easily expanded to include new facts.

Moderate Pragmatism: The society uses empirical methods, but many of its members accept mysticism as a valid approach. The society may be capable of rapid leaps of scientific progress, using imagination to uncover new avenues for empirical research.

Low Pragmatism (Mystical): The society does not value empirical inquiry, preferring to use intuition and revelation to understand the universe. Members of the society may cling to wildly abstract theories, ignoring any empirical evidence to the contrary.

Applications: Add the modifier to Reaction rolls when trying to convince a member of the society to change his views based on logical argument and empirical evidence. Subtract the modifier when appealing to abstract motivations (moral values or religious precepts).

INNOVATION

This parameter measures how easily local society develops new ideas, and how willing it is to accept social or economic change.

Modifiers: +2 if the society is Empirical, -2 if it is Mystical. +1 if the society is Cordial, -1 if it is Xenophobic. +2 if the beings making up the society have Extremely Curious, +1 if they have Curious, -1 if they have Incurious, -2 if they have Staid.

High Innovation (Progressive): The society embraces change. Its members may be experimenting with new technologies, new political or cultural values, even new artistic conventions. The society may also be interested in territorial or political expansion.

Moderate Innovation: The society tolerates change. There may be a conservative faction which tries to evaluate possible innovations and keep them under control. The society tries to assimilate one set of changes completely before moving on.

Low Innovation (Reactionary): The society is very stable, even stagnant. Little or no cultural change takes place. Members of the society tend to distrust any new idea. The society keeps within its established borders and refuses obvious opportunities to expand.

Applications: Use the Innovation modifier whenever a member of the society is trying to generate or spread a new idea. The modifier can be added to a Reaction roll when seeking financial or political support for new ventures.

PROVIDENCE

This parameter measures the society's relationship to time. It reflects whether people are aware of their cultural history, how well they plan for the future, and how wisely they husband resources.

Modifiers: +2 if the society is Reactionary, -2 if it is Progressive. +1 if the society is Collectivistic, -1 if it is Egoistic. +2 if the beings making up the society have Single-Minded, +1 if they have Attentive, -1 if they have Distractable, -2 if they have Short Attention Span.

High Providence (Prudent): The society takes a very long view. Members of the society are fully aware of events that occurred decades or centuries ago, and are used to planning for the needs of future generations. The society may encourage a strong sense of connection with one's ancestors and descendants. Resources are carefully hoarded and used as efficiently as possible.

Moderate Providence: The society operates on a time-span of years or decades. The events of a few years or decades ago are still fresh in people's minds. Members and institutions of the society may plan up to a decade or two into the future.



Low Providence (Reckless): The society is capricious, and has little or no institutional sense of time. Events of more than a few months ago are forgotten, events more than a few months away are not yet important. Members of the society rarely bother with long-term planning, and may tend to squander resources. Adaptability is a primary cultural value.

Applications: Use the Providence modifier whenever long-term planning is a factor. Add it to the Reaction roll when trying to convince a member of the society regarding the merits of a long-range strategy. Or *subtract* the modifier from effective skill when trying to convince someone to change plans on short notice.

Gender Roles

Almost all known human societies are, to some extent, male-dominated. The reasons for this are not well-known (and are controversial anyway), but the ethnographic study of many societies provides a few clues. Men have somewhat more physical strength, and they also usually monopolize the use of weapons. Thus if the local economy is heavily dependent on human muscle power, or if warfare between groups is common, then men will probably be in charge and women will have a deeply subordinate role. Where women can make a more equal contribution to economic or military efforts, they will tend to have a higher place, reaching complete social equality when conditions render the physical differences between the sexes irrelevant. Societies dominated by women, in which men are denigrated and devalued, are almost completely unknown among human beings.

A few other factors may tend to affect the relative status of the sexes. Matrilineal cultures will tend to give women higher status, although many such cultures are still male-dominated. Matrilocal cultures are even more likely to be egalitarian. In a matrilocal society, the women of a group will probably be closely related and will have lived together all their lives. They can therefore work together to restrain the men who marry in.

Naturally, the factor most likely to bring about social equality between men and women is *technology*. In most societies, by about TL8 there is no difference between the ability of men and women to perform any economic activity of significance. Military technology becomes gender-neutral at the same level. Beyond this point, gender inequities will only exist through sheer social inertia. Many of the high-population, high-technology worlds of the Imperium (the main drivers of Imperial culture) practice complete gender equality.

Note that gender *equality* doesn't imply gender *identity*. Many societies which allow men and women equal social status do not assign them identical social roles. Perhaps certain occupations are more likely to be undertaken by men, others by women. Both men and women may attain positions of social power, but the positions may be different in nature. For example, men may dominate the military leadership, while women control all important religious posts.

Rhylanor (VI)

As an example of the culture-design rules, we'll use the planet Rhylanor, as if a GM were detailing the world for his own Spinward Marches campaign. The details developed for Rhylanor in earlier sidebars can be used without modification as the basis for these social parameters, since the society being developed is equal to the population of one whole world.

The roll for *Pluralism* is unmodified. The GM rolls 3d for a 15, and finds that Rhylanor has a *diverse* culture. This makes sense, since although the planet is under a single government it is a center of commerce and Imperial administration. People from dozens of worlds have brought their own cultural values to Rhylanor. The *Pluralism* modifier is +2.



The *Toleration* roll is 3d+4 (+2 for the *Diverse* culture, +2 for the planet's Class V starport). The GM rolls a 15, so Rhylanor's culture is *Cordial* and the *Toleration* modifier is +2. Again, this makes sense for a major world of the Imperium.

The *Solidarity* roll is 3d+2 (+2 for the planetary PR of 9). The GM rolls an 11 and gets moderate *Solidarity*, with no modifier. The people of Rhylanor are not remarkable for their degree of cooperation or competitiveness.

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POLITICAL INSTITUTIONS

Interstellar travelers will often find themselves dealing with local governments (even if only in the course of overthrowing them). Knowing *who* to deal with, who can make decisions, is often of critical importance.

DIVISION OF POWER

In describing political institutions, we will use the common model which divides governmental authority into *executive*, *legislative*, and *judicial* sectors.

The legislative power is concerned with *making* law. Legislators write new laws and revise or repeal old ones. Many governments allow the legislative power to set budgets for other institutions and oversee their operation.

The executive power is concerned with *enforcing* the law. The executive is in charge of national administration, normally including the police, the military, and any regulatory bureaucracy. Another role normally held by an executive institution is that of "head of state," covering ceremonial and diplomatic functions where individuals must stand in for the society as a whole.

The judicial power is concerned with *interpreting* the law. Members of the judiciary make sure that other branches of government follow existing laws, and that the whole structure of law is consistent. When citizens are accused of breaking the law, the judiciary is responsible for managing the resulting court cases.

More than one of these powers can be combined in a single institution. A dictator ruling by decree may both make and enforce the laws, for example. Power can also be subdivided, so that a given function is shared among several different institutions.

During a planetary survey, the IISS normally assigns a "political type" to a world or region, as set in Step 21 of the world design process. If the political type isn't obvious, the survey team looks closely at the institution which seems to dominate the local political process. A government deliberately designed under a "separation of powers" philosophy, where the different branches are set up with roughly equal levels of authority, can be very difficult to unravel. In this case, the IISS tries to see which branch seems to gather the most public attention. Unfortunately, some political systems simply don't fit the standard model all that well, in which case the IISS surveyors do the best they can and move on . . .

GENERATING INSTITUTIONS

To describe a political institution, the GM needs to determine three basic facts about it: its *leadership structure*, its *principle of succession*, and its *sphere of authority*.

Leadership Structure

The leadership structure defines who is ultimately responsible for making decisions on behalf of the institution.

A *single individual* may make all important decisions. This is a very common leadership structure among human beings, who seem to need a strong leader at the top of every social hierarchy. Single-individual leadership is typical of monarchic or dictatorial systems of government, although many democratic societies place a great deal of power in the hands of a single leader (a President or Prime Minister).

A common variation on this form includes an *advisory council*, whose members help the leader make decisions. A president's cabinet is one example of such a council. In some political forms, the advisory council must approve the decisions made by the leader. One example would be that of a young monarch who has a Regency Council.

A *small council* is a group of 2-7 people who share authority over the institution. The members of the council may act to check each other's authority, requiring that all agree before anything significant can be done. Alternatively, the members of the council may each manage different aspects of their common authority. One member of an executive council might run the military, another the internal police, another the treasury, and so on.

A *large council* is a body of 8 or more people who must all participate in any decisions. Such a large body is often clumsy when it tries to act quickly. A large council may therefore appoint a single leader or a small council from among its own members. The important fact here is that the large council remains in command and can remove or override its appointees at any time. The British House of Commons is an example of such a large council, wielding both legislative and executive authority. The House as a whole makes law, but certain members of the House are named as senior executive officials to manage the government's routine operations.

Multiple councils often appear in governments that are specifically designed to divide authority. In this form, at least two separate councils of variable size exist, and must interact to make decisions. An legislative example of this form is the U.S. Congress, which is composed of two distinct large councils with different structures and roles.

Beyond the multiple-councils structure are those forms which rely on direct participation from the citizens. *Limited direct participation* implies that decisions are made by a limited subset of the whole citizenry. Participation may be limited to members of a specific gender, age group, ethnic group, economic class, religion, political party or some other class. An example of this form was the Assembly of classical Athens, which included all male adult citizens but excluded children, women, resident foreigners and slaves.

Full direct participation means that most or even all citizens may influence decisions made by the institution. Such "direct democracy" is very rare in human history, limited mostly to very small political units. High-tech societies may rely on advanced computer technology to help the citizenry stay informed and make decisions.

Rhylanor (VI)

[Continued]

The Tractability roll is 3d+1, since the world is governed by an Oligarchy. The GM rolls a 13 and gets moderate Tractability, with a modifier of +1. The people of Rhylanor are fairly content with their government, but are not reflexively obedient.

The Aggression roll is 3d, and the GM gets a 10. The populace has moderate Aggression, with no modifier. They have no extreme attitudes toward the use of force.

The roll for Pragmatism is an unmodified 3d. The GM gets a 12, recording moderate Pragmatism with a +1 modifier. The people of Rhylanor are somewhat methodical in approach, but not to an extreme.

The Innovation roll is 3d+1, since the society is Cordial. The GM rolls an 11 and records moderate Innovation with no modifier. Rhylanor is not stagnant, but neither is it the scene of rapid innovation in any field.

The GM rolls 3d unmodified for Providence. The result is a 12, so the society has moderate Providence and a +1 modifier. Members of the society tend to be slightly more prudent than the norm. The GM decides that this attitude is influenced by the need to maintain the complex environmental systems that sustain the world's high population.

Rhylanor's planetary culture is Diverse and Cordial, but has no other remarkable features. This is probably typical of many of the high-population, high-technology worlds which participate fully in Imperial civilization.



Imperial Nobility

The rules in the main text are fine for setting up political institutions for planetary or local government. But if the world is a member of the Imperium, how does the Imperial nobility fit into the system?

The answer, of course, is “it depends.” Every world has a slightly different situation. The typical world has a complement of Imperial nobles who hold fiefs there, land or business holdings that give them an interest in local events. Small, unimportant worlds may have only a single baronial family in residence, while high-population worlds may host hundreds of members of the peerage. These nobles don’t necessarily have any formal role in local government. Naturally, their wealth, prestige and offworld connections will give them considerable indirect influence.

Of course, nobles who formally represent a given world will have some relationship with local administration. If they spend most of their time in residence, the local government will partially fund their permanent office and staff, and they will occasionally be consulted before important decisions are made. Such nobles often fall into the role of “Imperial ambassador” to their world, even while they represent that world’s interests in the Moot.

Resident nobility may sometimes hold office in one or more of the local institutions. They may share executive power, act as head of state, hold guaranteed seats in the legislature, or serve on the highest courts. Normally, only the most radically democratic worlds will refuse to allow *any* formal role for their resident nobility. Of course, there are the so-called “Imperial” worlds which are directly owned or ruled by the nobility. On these worlds, the nobles draw up the local constitution to suit themselves.

Another complicating factor: the Imperium has a habit of ennobling local political leaders, if they demonstrate great ability and loyalty to Imperial interests. Even a democratically elected statesman may suddenly receive a “letter patent” and find himself holding a *hereditary* knighthood or barony. This often means that the local leadership is salted with Imperial nobles, even if the formal constitution allows the nobility little role.

Principle of Succession

Government institutions must be *legitimate* if they are to function well. In this context, “legitimacy” means that the citizens agree that their government has the authority to rule them. Without that agreement, the government can only maintain itself in power by force. Legitimacy usually requires a clear method for choosing government officials, so that the citizens will continue to agree to be ruled by each new office-holder in turn. Each institution therefore has a principle of succession, a rule that defines who is chosen to fill each office when it becomes vacant.

Situations where there is *no rule of succession* usually mean that the institution has no legitimacy. The citizens may regard the *current* office-holder as a worthy leader, but that feeling will not necessarily carry over to anyone who replaces him. Or the citizenry may “agree” to be ruled only because of the threat of force.

Hereditary succession is often used in monarchic or feudal systems of government. In this case, authority is usually held for the life of the office-holder. When he retires or dies, his power is handed on to one of his heirs according to local inheritance customs.

Adoptive succession is rather like hereditary succession. Each office-holder appoints his successor, who may or may not be a family heir according to local custom. Sometimes the office-holder formally adopts his successor into his family (some of the Roman emperors used this system). Another example is the corporate executive who names his own successor upon retirement.

Appointive succession is the next step away from pure hereditary succession. Here, each official is appointed by some other official in the government, possibly from a different institution. Office-holders may retain their positions for life, or for a fixed term. For example, members of the US Supreme Court are appointed by the President as vacancies appear, subject to the approval of Congress.

Limited election means that officials are elected by a limited subset of the whole citizenry. The *franchise* or right to vote can be limited by a variety of methods, just as the right to direct participation can be limited. *Open election*, on the other hand, means that officials are elected by most or all of the citizenry. Election procedures vary widely, with most societies designing the election system to fit local ideas about fairness and the balance of power. Whether elections are limited or open, candidates may be required to meet certain criteria before running for office, and they must usually face re-election after a fixed term in office. The United States has demonstrated both kinds of election system. Early in its history, only white male adult property-owners could vote for certain offices (limited election), but today almost all adults can vote for all offices (open election).

Random selection means that officials are selected from among the citizens using some kind of random procedure. The pool of candidates for a given office may still be required to meet certain qualifications and serve for fixed terms. Random-selection systems are normally designed so that almost every qualified adult can count on serving in the government sometime in his life. They are fairly rare, usually appearing only in “Athenian” democracies where a great deal of public participation in government is normal. In fact, classical Athens used this system for many of its executive and judicial offices.

Direct participation implies that there is no rule for legitimate succession, because there is no individual holding the office. Decisions are made by the citizens themselves.



Procedure

To design a political system for a society or world, begin by deciding how many major institutions there are. If the local political type is Anarchy, then there will be no institutions (and no government). Few governments will have more than three major institutions. The U.S. federal government, for example, is headed by three major institutions: the Presidency, the Congress, and the Supreme Court. The government of the United Kingdom also has three major institutions: the monarchy, the House of Commons, and the House of Lords. Repressive governments and dictatorships tend to concentrate power in fewer major institutions.

While choosing the number of major institutions, decide what functions each institution will carry, and which institution has the most power. Allocate executive, legislative, and judicial functions. If two or more institutions share a given function, decide what role each has. The dominant institution will usually carry executive or legislative powers, or both. Finally, assign the head-of-state function to one institution, usually one with executive powers. If you want to determine the character of the dominant institution randomly, roll 3d on the Division of Powers Table.

Division of Powers Table

Roll (3d)	Dominant Institution	Secondary Institutions
4 or less	Judicial only	Executive and Legislative
5-6	Legislative only	Executive and Judicial
7-8	Executive only	Legislative and Judicial
9-10	Executive-Legislative	Judicial
11	Executive-Judicial	Legislative
12	Legislative-Judicial	Executive
13 or more	Undivided authority	None needed

For each institution, choose an appropriate leadership structure or roll 3d on the Leadership Structure Table. Modifiers: -6 for an institution with only executive powers. Add the modifier from the Institution Structure Modifiers Table for the planet's political type.

Rhylanor (VII)

The GM proceeds to develop a governmental structure for Rhylanor. *Behind the Claw* claims that the planetary government is based on a hereditary aristocracy, so the GM keeps that in mind.

The GM begins by rolling on the Division of Powers Table. He gets a 7, which indicates that the dominant institution has executive powers. There will be secondary institutions with legislative and judicial powers as well. He then rolls 3d-8 on the Leadership Structure Table (-4 for Oligarchy, -4 for an executive-only institution). The result is a 1, indicating that executive power is held by a single individual with his advisory council. A roll of 3d-8 on the Principle of Succession Table also yields a 1, indicating hereditary succession.

The GM decides that Rhylanor is ruled by a planetary king, who is the supreme executive authority as well as head of state. The king can't be an absolute monarch, since the planet's political type isn't Dictatorship. He operates within strict constitutional guidelines and must consult with his Privy Council, whose members are drawn from the planet's higher nobility.

Proceeding to the legislative authority, the GM gets an 11 on the Leadership Structure Table and a 1 on the Principle of Succession Table. The legislative authority on Rhylanor is a large council whose members hold office by right of hereditary succession. The GM decides that the planet's entire peerage gathers in a planetary Moot to make law.

For the judicial authority, the GM rolls a 5 for Leadership Structure and a 3 for Principle of Succession. The planet's highest court is a small council whose members inherit their posts. The GM decides that Rhylanor's Supreme Court consists of seven of the highest planetary nobles. These seven Law Lords rule on the most important cases, and also appoint and oversee all lower courts for the planet.

At this point, the GM realizes that he needs to further develop the relationship between Rhylanor's planetary nobility and the Imperial peerage. It would be strange for there to be no connection, since Rhylanor is one of the Imperium's more important worlds. The GM decides that some of the planet's noble families also hold Imperial baronial titles. Such "dual peers" are called by both their planetary and Imperial titles when at home, but by only their Imperial title when off-world. The planetary king of Rhylanor also holds the Imperial title of Marquis of Rhylanor. Meanwhile, there is also a Duke of Rhylanor, the senior Imperial noble in the subsector. He resides on Rhylanor and holds a large fief there, but he is not a member of the planetary peerage and plays no direct role in planetary government.

Interest Groups

A society's dominant political institutions, those which appear in the official constitution, are only part of the story. There are always secondary institutions which have no official role, but which act to *influence* the government to support their own interests. The official institutions may be the mechanism by which law is made, but these interest groups often decide what laws are made using that mechanism.

The details of interest groups are probably important only if a given world is going to be very important to your campaign (or if the campaign involves a lot of political intrigue). In that case, the GM should at least consider what kind of interest groups have the most influence on local government.

Clubs, associations, and secret societies will have considerable importance in any reasonably open form of government. It's natural for people to discuss politics and discover common political opinions during social gatherings. From there it's a short step to deciding to act as a group to pressure the government. Aside from the normal process of voicing opinions, club memberships are an easy source of "shock troops" for political demonstrations. Members of widespread secret societies may help each other to attain political office.

Religious groups are almost always of importance, even in nontheocratic states. Most religions include a well-defined ethical code, which devout people will naturally want written into the laws of the state. Where one religious sect is dominant, the government often finds itself unable to act without at least the tacit support of the church. Religious diversity, on the other hand, can lead to a "secular" state (and possibly a great deal of religion-inspired political conflict).

Families often play a role in political affairs. This is especially true in clan/tribal, monarchic, or feudal societies, but prominent political families can appear even in open democracies. When parents have held public office, it's natural for their children to grow up interested in politics as well, leading to a "dynasty" whose members are all elected to office. Family ties can also play a role in any society where it is acceptable to use public office to promote one's own relatives.

Continued on next page...

Institution Structure Modifiers Table

Political Type	Structure	Succession
Anarchy	(No roll)	(No roll)
Clan/Tribal	-8	-8
Corporate State	-4	+0
Athenian Democracy	+8	+8
Oligarchy or Feudal	-4	-8
Representative Democracy	+0	+4
Technocracy	+0	+0
Captive Government	-4	-4
Meritocracy	+2	-2
Bureaucracy	+2	-6
Dictatorship	-8	-8
Theocracy	-8	-4

Leadership Structure Table

Roll (3d)	Leadership Structure
0 or less	Single individual
1 - 4	Single individual with advisory council
5 - 8	Small council
9 - 12	Large council
13 - 16	Multiple councils
17 - 20	Limited direct participation
21 or more	Full direct participation

Now choose a succession principle. If the leadership structure involves limited or full direct participation, the succession principle is also "direct participation." Otherwise a different rule of succession must be chosen. To choose a principle at random, roll 3d on the Principle of Succession Table. Modifiers: add the modifier from the Institution Structure Modifiers Table.

Principle of Succession Table

Roll (3d)	Principle of Succession
0 or less	No rule of succession
1-4	Hereditary succession
5-8	Adoptive succession
9-12	Appointive succession
13-16	Limited election
17-20	Open election
21 or more	Random selection

TECHNOLOGICAL PROFILE

The IISS assigns a Technology Level to each world, matching the TL generated in Chapter 5. This TL characterizes the level of technology that is commonly available on the world. However, few cultures follow the exact pattern of technical achievement implied by the standard TL system. The GM may wish to develop a more detailed Technology Profile for any world.

We divide the profile into a number of Area Tech Levels (ATLs), divided into two groups. Each group is headed by an ATL which indicates a level of achievement in theoretical science. This level can easily be different from base TL for the world. A higher level indicates that the local culture has assimilated more theoretical knowledge than it is willing or able to implement in practical

technology. A lower level probably indicates a cultural “block” which prevents progress in that area of science.

Each group also includes several ATLs indicating different aspects of the technology available to local industries. Where these are lower than the world’s base TL, it indicates that development has been retarded in that area. This may be because of a failure of local research and development. Or the population may simply prefer offworld products in that sector, so that there is no market for local production. If an ATL is *higher* than the base TL for the world, it indicates that there have been recent breakthroughs. Goods using the new technology are locally available, but they are likely to be expensive or unreliable.

Note that the sequences described here indicate the TL at which various developments are likely to be *discovered*, assuming a society must learn each technique from scratch. While this fits the usual concept of “technology levels,” it isn’t entirely realistic. If a society knows that certain techniques are *possible*, it may be able to develop them (or discover workable substitutes) at a much lower TL than indicated here.

The technological areas are as follows:

Physical Science: Theoretical understanding regarding the physical universe.

Materials: Technology involving material production and processing. This area underlies many others, and directly governs the materials available for armor and hull materials.

Energy: Technology involving energy production and storage. This area governs power systems for vehicles and equipment.

Information: Technology involving communications and information processing. This area governs equipment such as communicators and computers.

Transport: Technology involving methods for moving goods and people. This area governs general designs for vehicles and nonvehicular transport systems.

Weapons: Military technology, governing both personal and heavy weapons as well as defensive systems.

Biological Science: Theoretical understanding regarding the workings of life forms.

Medicine: Technology involving the care and healing of living things. This area governs the effectiveness of available medical and surgical methods.

Environment: Technology involving the maintenance of ecosystems. This area governs the ability of civilizations to avoid damaging the environment, to reconstruct a damaged ecosystem, or to terraform an uninhabitable planet.

Procedure

Begin by determining the Imports TL. This is the highest available TL for the interstellar society the world belongs to. In the Imperium, for example, the Imports TL would be 12, while in the Zhodani Consulate it would be 11. An interdicted world, or any other world with no interstellar contact, has an Imports TL of 0. The GM should use common sense to resolve situations for worlds which have only sporadic outside contact, or which might have substantial imports from an interstellar state of which it is not itself a member.

Each ATL is based on either the world’s base TL or another ATL. It is modified based on the local situation, and then the result of a 3d roll on the Tech Level Modifier Table is added. Refer to the descriptions of each area below to determine exactly how to proceed. The minimum for any ATL is 0, the maximum is 12 (unless the GM wishes to deliberately introduce a society to his game with higher than Imperial-maximum technology).

Interest Groups

[Continued]

Political parties are large-scale organizations deliberately designed to influence the government, usually (not always) in a democratic state. Party members do many of the same things that members of non-political clubs do: pay dues, attend meetings, and support party activities. Political parties play an important role in choosing who may serve in government office. They choose certain members to run as candidates, and deliver votes by encouraging their members to follow the party’s lead in the ballot box. Powerful political parties can drastically *limit* the choices available to the electorate, by preventing nonparty candidates from having the opportunity to run for office. On the positive side, large political parties can make democratic governments more stable by “aggregating interests,” gathering many smaller interest groups together and forging compromises between them.

Note that political parties do not appear in all democracies. Sometimes a democracy is characterized by short-lived alliances that gather around individual statesmen. If a given politician loses his influence, his allies go elsewhere. This kind of political culture is common in relatively small democracies, such as low-tech city-states. Political parties tend to appear when the electorate is so large that political alliances can no longer be personal in nature.

Political parties are not limited to democratic states. Many dictatorships and other totalitarian regimes begin when one political party reaches a dominant position, takes total control of the state, and then outlaws all its political opponents. Such a “one-party state” can be a democracy in name, yet be very repressive in practice.

Advocacy groups are similar to political parties, but smaller in scale. An advocacy group may serve a social function, but its primary role is to pressure the government on a single issues. They will often work to support a large-scale political party, in return for a commitment to pass the “right” legislation once the party is in power.

Media organizations such as newspapers, broadcast stations, and information-net “content providers” play an important role in the political process. They bring information on law and politics to the citizenry, often with subtle (or not-so-subtle) biases toward certain policies.

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Interest Groups

[Continued]

Large businesses are natural secondary institutions, since money can lead to power in almost every form of government. Businesses have a natural interest in influencing economic law so as to give themselves an advantage over their competitors. Small businesses will not have the same ability to influence government on their own, but they may band together to have the same effect.

Guilds and trade unions represent workers, but they have many of the same political goals as large businesses: legal protection and competitive advantage for their members. They are often populist in nature, representing ordinary citizens against the actions of large businesses or established political institutions.



Legal Structure

Law is the tool by which governments act. While ethics and morality are defined by local cultural values, law is set through an explicit *political* process. While law often reflects local moral values, the match is usually imperfect.

Governments implement law by using force. Those who break the law are captured, confined, and punished by designated government agents (police). Indeed, some political theories define government as the sole social institution which may legitimately use force to pursue its aims.

GURPS Traveller measures law using Control Ratings, indicating how local political institutions approach the task of governing the populace. At low Control Ratings, there are few laws and they cover only matters of great importance. Citizens may be required to enforce the laws themselves, and the punishments for lawbreakers are light. At moderate Control Ratings, there are more laws covering a wider variety of subjects. Government will employ official police to enforce the law. At high Control Ratings, there will be many laws covering all aspects of life. Police will be common and intrusive, responding even to trivial violations with force.

The Control Rating generated in Chapter 5 is a good overall indicator of the intrusiveness of local government. The GM may wish to expand the CR into more detail. Political philosophies differ in what aspects of life require the most regulation.

Continued on next page...

Tech Level Modifier Table

Roll (3d)	Modifier
5 or less	-4
6	-3
7	-2
8	-1
9-16	+0
17	+1
18 or more	+2

PHYSICAL TECHNOLOGIES

Physical Science

The base TL for this theoretical area is the base TL for the world. If the Imports TL is higher than the local base TL, add half the difference (rounded down). Add a result from the Tech Level Modifier Table.

TL0: Animistic explanations for physical processes.

TL1: Engineering and architecture by rule-of-thumb techniques. Astrology appears due to the need to time seasonal activities (planting and harvest, for example).

TL2: Geocentric theory of celestial motions. First empirical rules of mechanics.

TL3: Observational astronomy matures, with very precise naked-eye observations of planetary and stellar motions.

TL4: The telescope leads to a revolution in astronomical observation. Old theories of mechanics and celestial motions are rejected, usually in favor of a heliocentric theory.

TL5: The first synthesis of celestial and local laws of motion, usually along the lines of Newtonian mechanics. Engineering begins to rely on rigorous mathematics and empirical investigation of materials.

TL6: Flaws in the Newtonian synthesis become obvious. New theories involve elements of quantum mechanics and Einsteinian relativity. First approximate measurements of galactic distances.

TL7: High-energy physics elaborates on the basic structure of quantum and relativistic theory. First full classification of elementary particles and forces. Cosmology appears as a viable science.

TL8: Quantum physics and relativity theory are reconciled in some form of unified field theory. One consequence of the new theory is gravity-manipulation technology. A few cultures discover jump space at about this point.

TL9: Empirical observations allow full access to jump space. The exact relationship of jump space to normal space remains a mystery. Gravitic manipulation continues to advance.

TL10: Continued elaboration on unified field theory leads to practical methods for manipulating the strong and weak nuclear forces.

TL11: Advanced control of gravity, including the creation of artificial gravitic fields at a distance.

TL12: Tentative theory unifying the known physics of normal space and the observed physics of jump space.



Materials

The base TL for this applied area is the base TL for the world or the ATL for Physical Science, whichever is less. Add a result from the Tech Level Modifier Table.

TL0: Use of “found” materials in construction (wood, stone, bone and hides).

TL1: Bronze working, hard woods, quarried stone.

TL2: Iron working, fine carving of quarried stone, cement and concrete.

TL3: Improved iron working, soft steels. Reinforced concrete becomes possible, although it is more likely to appear once hard steels are available (at TL4-5).

TL4: Hard steels, advanced masonry techniques.

TL5: Large-scale production of hard steels, allowing their use as structural members.

TL6: Versatile metal alloys, plastics and other synthetic materials.

TL7: Light composite materials, advanced ceramics.

TL8: Composite laminate materials. Earliest experiments with nanotechnology.

TL9: Crystalline iron and other super-strong allotropes of industrial metals.

TL10: Gravitic manipulation allows the creation of superdense materials. Nanotechnology finally becomes practical for industrial applications, although these are very limited. Long-standing predictions of a “nanotech revolution” fail to materialize.

TL11: Techniques for reinforcing the electron bonds in superdense material, increasing its strength further. Industrial nanotechnology spreads into new applications, reducing production costs for many items and producing new materials.

TL12: Incremental improvements in structural materials and nanotechnology.

Energy

The base TL for this applied area is the base TL for the world, the ATL for Physical Science, or the ATL for Materials, whichever is least. Add a result from the Tech Level Modifier Table.

TL0: All work is driven by muscle power, including the energy of domesticated animals and slave labor.

TL1: Early water wheels used for irrigation.

TL2: Advanced water wheels, including complex mechanisms to drive mills or other equipment.

TL3: Windmills.

TL4: Mechanical means for energy storage (clockwork).

TL5: Steam engines, followed by the exploitation of wood and coal for fuel. Electrical energy appears late in the period, transmitted through local power grids and stored using simple chemical batteries.

TL6: Internal combustion engine appears and causes large-scale exploitation of oil and natural gas takes place. Electric power grids cover large urban areas and begin to reach the countryside.

TL7: Fission power plants and radiothermal generators. Electric power grids reach continental scale. Energy storage includes advanced chemical batteries and fuel cells.

TL8: Advanced radiothermal generators (NPU's). Solar power becomes practical, especially in space. Microwave beamed power. Superconducting materials make power transmission much more efficient and lead to the development of advanced power cells.

Legal Structure

[Continued]

Public Safety: Most governments regulate the possession or use of items which can cause injury or death. Perhaps people must prove that they are competent drivers before they may be licensed to operate a vehicle. Weapons can also be regulated for similar reasons. The higher the Control Rating, the more restrictions are placed on weapon ownership and use.

Economic Activity: Most governments also regulate economic activity by the citizens. At low CR, the government may simply enforce contracts or prevent fraud or deception in business affairs. At higher CR, the state may regulate how businesses operate, requiring licenses or permits or even prohibiting certain kinds of trade. At very high CR, the state may effectively run all businesses, deciding for each citizen what work he must do and what pay he can expect for it.

Taxation also comes under the heading of economic law. A low CR here means that taxes are light and fair. As CR increases, the state demands more and more revenue, and may use the tax laws to reward or punish certain kinds of economic activity. At very high CR, taxes are crushingly heavy, to the point where the state is the primary beneficiary of every economic transaction.

Personal Freedom: Every citizen makes choices that don't obviously affect the physical safety of others and don't have a clear economic aspect. Laws regarding personal freedom affect these choices: what opinions to hold and express, what materials to read, what religion to practice, who to associate with, where to travel, what leisure activities to enjoy.

At low CR, the state doesn't regulate these activities, and may instead enforce laws that guarantee the citizen considerable personal privacy. At higher CR, the state takes greater and greater interest in personal liberties, possibly tracking the activities of the citizenry, possibly restricting some of them. At very high CR, the citizen has no rights of privacy against the state, and any kind of activity can be considered criminal.

Civil Law: Most states recognize a wide variety of actions which are not criminal, but which constitute a violation of one citizen's rights by another. One of the government's roles is as an arbiter in such disputes. Civil law details the ground rules under which such conflicts are resolved.

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Legal Structure

[Continued]

At low CR, there may be little concept of civil law at all. The government will only interest itself in criminal actions, and allow citizens to resolve their own disputes in whatever noncriminal manner they wish. As CR rises, the government involves itself more in civil disputes, setting up a code by which those who harm others must make restitution. At some point, the concept of "punitive damages" arises. This allows the plaintiff to demand more than simple restitution would require, so as to punish the defendant for his actions. At high CR, punitive damages can vastly outweigh restitution, and the state may collect part of each settlement for its own purposes.

We assume that the CR generated in Chapter 5 always matches the level of control for Public Safety. The rules for determining what weapons are legal for any given CR are established elsewhere (see p. S54). To generate varying CR for the other three categories, roll 3d for each on the Law Variation Table. Add the resulting modifier to the base CR for the society (minimum 0, maximum 6).

Law Variation Table

Roll (3d)	Modifier
3	-4
4	-3
5-6	-2
7-8	-1
9-12	+0
13-14	+1
15-16	+2
17	+3
18	+4

*"How many Scouts does it take to **find** a light bulb?"*

— Anonymous

Progress

The main text includes rules for determining the *current* state of a world's technological accomplishment. The *Traveller* universe isn't static, however. Worlds are always making technological advances, while others lose the technical knowledge they have. What determines the rate at which progress takes place?

Continued on next page...

TL9: First fusion power plants. Energy grids have become global in scope.
TL10: Advanced fusion power plants have become the backbone of the planetary energy economy.

TL11: Incremental improvements in fusion power technology.

TL12: First large-scale production of antimatter. The new material has industrial uses, but is very expensive and strictly controlled. Antimatter-based power is not yet practical.

Information

The base TL for this applied area is the base TL for the world, or the ATL for Materials, whichever is less. Add a result from the Tech Level Modifier Table.

TL0: Communication by runner, with memorized messages and oral tradition. Whole-number mathematics.

TL1: Writing is used almost exclusively by social elites for record-keeping. Rational-number arithmetic.

TL2: True literacy appears, as writing is used for many purposes other than simple record-keeping. Incremental improvements in mathematics, often including a systematic study of geometry and formal logic.

TL3: Block printing, too cumbersome to have broad impact. Algebra and trigonometry.

TL4: Movable-type printing, making printed material cheap and commonplace. Long-distance communication supplemented by organized semaphore networks. Development of calculus.

TL5: Mechanized printing devices make printed material ubiquitous. Personal printing devices (typewriters). Mechanical calculating devices. Long-distance communications via electric signals (telegraph and voice telephone).

TL6: Radio telegraph and voice transmission. Massive electrical calculating devices for specialized applications.

TL7: Programmable electronic computers, rapidly becoming small and cheap enough to allow personal use on the desktop. Advanced radio communications include radio telephony, image transmission ("television"), satellite relays, and digital signaling.

TL8: Almost every device has a small, specialized computer in it ("ubiquitous computing"). Computers can be programmed in high-level languages that approach the ease of natural language. Meanwhile, computers can be used (not programmed) in natural language via smooth voice recognition and real-time linguistic transcription. Fiber-optic networks and digital signals are applied to a global information network. Personal image transmission (videophone, flat-screen TV).

TL9: Linguistic interfaces improve, allowing computers to be programmed exclusively in natural language. Computers are capable of reasonable linguistic interpretation. Holographic ("three-V") telephones and media.

TL10: Artificial intelligence makes computers capable of some of the same self-programming capability and flexibility as biological intelligence (self-awareness is not yet possible).

TL11: Real-time linguistic analysis and translation. Small computer brains of roughly human intelligence, allowing the construction of convincing humanoid robots. Experimental meson communications.

TL12: "Pseudo-reality" computers allow the perfect simulation of physical reality and living personalities. First experiments with true machine consciousness. Common meson communications.

Vehicles

The base TL for this applied area is the base TL for the world, the ATL for Materials, or the ATL for Energy, whichever is least. Add a result from the Tech Level Modifier Table.

TL0: All land travel is on foot, possibly with the help of draft animals. Water travel is by raft or canoe.

TL1: The wheel allows draft animals to pull carts or chariots. Small rowed ships and single-masted sailing ships can cross short stretches of open water.

TL2: Road networks and bridges. Large, specialized rowed ships (triremes, galleys) and double-masted sailing ships.

TL3: Incremental improvements in land transport (improved animal harness, animal shoeing, and so on). Sailing vessels now strike out across open ocean, although navigational methods are still rudimentary. Some cultures begin experimenting with rockets and kites.

TL4: Fast long-distance travel by coach. Sailing vessels use complex square-rigging techniques. Dead-reckoning navigation leads to long-distance voyages of discovery. First theoretical designs for simple aircraft.

TL5: Steam power revolutionizes transport. Railroad lines are supplemented by fast stagecoach service in frontier areas. Steam-powered ships replace sailing vessels for short-distance applications. Precise navigation makes planet-wide sea transport routine. Hot-air balloons and experimental propeller aircraft.

TL6: Fast railways and electric trains. Personal automobiles. Tracked vehicles, usually restricted to military applications. Massive steam-powered sea vessels, supplemented by the first practical submersibles. Advanced balloons and dirigibles become practical for slow, long-range applications. Advanced propeller-driven aircraft, supplemented late in the period by jet aircraft. First sub-orbital rockets.

TL7: Advanced automobiles. Ocean-going vessels and submersibles use nuclear power. Hovercraft and hydrofoils for specialized purposes. Jet aircraft dominate air transport, with some models attaining supersonic speeds. Manned orbital rockets allow exploration of near-planetary space. Some cultures experiment with nuclear-powered spacecraft (the "Orion" concept).

TL8: Electric automobiles. Incremental improvements in water-transport technology, including "triphbian" vehicles. Hypersonic and semi-ballistic aircraft. Lightsails and practical fission and ion drives allow manned interplanetary missions. Some cultures refine the Orion drive to reach the planets *quickly*. New advances in physical science lead to experimental "contragrav" vehicles and reactionless thrusters.

TL9: Ultra-fast rail lines, comparable in speed to hypersonic aircraft but restricted to underground tunnels. Personal grav cars. Fusion rockets become practical, although the new reactionless drives are much faster and more efficient. Cultures using the Orion concept begin to abandon it at this point. If jump-space has been discovered, starships will now be possible with the development of the jump-1 and jump-2 drives.

TL10: Grav vehicles become the basis for all forms of transportation (land, sea, air and space). Personal grav belts. Jump-capable cultures develop jump-3 drive. Others will attain their first interstellar capability using slower-than-light fusion drives.

TL11: Antimatter rockets appear but are almost never used, being more inefficient (and more dangerous) than reactionless drives. Jump-capable cultures develop jump-4 and jump-5 drives.

TL12: Incremental improvements in maneuver drive technology. Appearance of jump-6 drive.

Progress

[Continued]

On Terra, the Solomani had attained TL1 circa -7500, at the beginning of the Bronze Age. It took about 2000 years for the first Solomani societies to reach TL2, about 1500 years after that to attain TL3, and about 1000 years again to achieve TL4. This kind of progression is typical for pre-industrial societies, in which innovation is a very slow and uncertain process. Whole civilizations can rise and fall without making more than superficial changes to the same general set of technologies.

After reaching TL4, the Solomani entered a period of rapid technical progress that is nearly without precedent in human history. This progress centered on the civilization of Western Europe, which had several unusual features. Europe was divided among many competing nations, each of which had its own language and (to some extent) its own culture, incompatible with the others. These national divisions were large enough to develop strong local cultures, but too small for any one of them to dominate the others. This division forced the Europeans to constantly look for advantage over each other, preferably an "edge" that even small nations could exploit against large ones. Such advantages were often technological in nature. Furthermore, the fact that Europe was divided ensured that if progress was stifled by one short-sighted government, it would continue unabated elsewhere. Division also brought about diversity in ideas and viewpoints. Finally, European civilization had recently given rise to the so-called "Enlightenment," a philosophical movement which emphasized rational inquiry and the collection of knowledge. All these factors combined to produce the astonishing Solomani flowering.

Earth went from TL4 to TL9 in the space of only 600 years, with most of that progress taking place in the last 200. At that point, the Solomani encountered the First Imperium. The stress of the Interstellar Wars pushed the Solomani into attaining a slight advantage over the Vilani, reaching TL10 after about 100 years at TL9. Further technical progress slowed drastically once the Interstellar Wars were over. Terra and its nearest colonies had come under a unified government during the wars, and once the question of immediate survival was over the governing elite lost interest in rapid technological change. Meanwhile, the Solomani who settled the former Imperial worlds had too much to do just exploring and administering their new realm. The Rule of Man remained at TL10 until its end.

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Progress

[Continued]

In comparison, the Vilani first reached TL9 about -9300. Vilani ascendancy in the galaxy lasted for over *seven thousand years*, during which time they never advanced beyond late TL9. Admittedly, the Vilani are unusually conservative, but even so such a long period without significant progress demands explanation. Certainly the Vilani enjoyed none of the factors that drove Solomani innovation. They were culturally unified from a very early period, and their civilization put a much higher value on conserving knowledge than on extending it. Some historians speculate that every society has a natural limit to its technical or cultural progress, which will only be exceeded in very unusual circumstances. If this theory is true, then perhaps the pre-contact Solomani civilization simply had a broader natural limit than did Old Vilani culture.

Technologies beyond TL10 appear to be difficult to reach. At the end of the Long Night, the Third Imperium had regained access to TL10 technology. It attained TL11 after the Civil War period, and TL12 about 1000. Most scientists predict that TL13 will not be available for centuries, barring unexpected breakthroughs in several key areas (or contact with a presently unknown civilization with higher technology). In some respects, the Third Imperium is not a terribly innovative civilization. The Vilani influence is doubtless important in keeping change under control. Further, it's difficult for scientists to exchange results when separated by many parsecs – especially when so many of the best are in Imperial or megacorporate employment, unable to share their work freely.

There is one example of rapid human technical progress that puts even early Solomani civilization in the shade. The dominant civilization on Darrian had reached early TL5 by about -1500. At that point, a small group of Solomani arrived, fleeing the chaos that followed the collapse of the Rule of Man. The Solomani blended into Darrian society quickly, sharing their advanced technology. As a result, the Darrians zoomed from TL5 to TL13 in less than 600 years. Had the Maghiz not occurred, they would probably have advanced even further.

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"Courier Service members . . . tend to cultivate an image as rakish adventurers, daring any peril to deliver the vital data or packages entrusted to them. In reality, their job is only occasionally dangerous, and is sometimes almost as dull as that of an Xboat pilot."

– Colonel Robert L. Wyssarban, Security Branch

Weapons

The base TL for this applied area is the base TL for the world, the ATL for Materials, or the ATL for Energy, whichever is least. Add a result from the Tech Level Modifier Table.

TL0: Stone knives, stone-pointed spears and arrows.

TL1: Bronze stabbing swords and spear points. The composite bow becomes the primary battlefield weapon, possibly wielded by chariotry. Spring-powered stone-and bolt-throwers.

TL2: Iron replaces bronze, leading to a revolution in military styles as more people can afford weapons. Mass tactics (phalanx and legion) evolve. Torsion-powered catapults.

TL3: Steel weapons. Counterweight-powered engines (trebuchets). A few crude gunpowder cannon (bombards) appear late in the period.

TL4: Black-powder weapons (matchlocks and flintlocks). Mass tactics involve techniques for managing volley fire). Cannons are now standard heavy artillery.

TL5: Percussion-cap weapons, far more accurate and reliable (revolvers, rifles, repeating rifles). Machine guns and heavy cannon. Abandonment of the old volley-fire techniques of mass combat, forcing a more open order and greater reliance on mobility.

TL6: Powerful smokeless-powder weapons, along with full-automatic weapons for small-unit support. Advanced indirect-fire techniques. Self-propelled guns (tanks). Large air-dropped explosives, including (late in the period) fission bombs.

TL7: Small-arms technology continues to advance. Advanced AFVs dominate the battlefield, with air and infantry support. Fusion and enhanced-radiation bombs.

TL8: Caseless ammunition. Energy weapons appear in the heavy-support role (laser and particle cannon). Experimental laser small-arms are produced late in the period.

TL9: The "firearm" attains its full maturity with advanced caseless-ammunition weapons (the ACR). Laser weapons become more common on the small-unit scale. Exoskeletons produce "powered infantry" units. Plasma cannon.

TL10: Laser and gauss rifles become the standard infantry weapon, while plasma rifles (PGMP) enter use for squad support. Advanced (X-ray) lasers. Full-coverage powered armor. Heavy artillery includes fusion guns. Nuclear weapons suddenly go into decline with the appearance of the battlefield nuclear damper.

TL11: Fusion guns (FGMP) appear in the squad-support role. Powered armor continues to improve. Antimatter warheads replace the near-obsolete fission or fusion bombs.

TL12: Incremental improvement in all weapons systems. Experimental neural weapons and stunners, not generally used in military applications. Black-globe technology is sometimes applied in deep-space combat.

BIOLOGICAL TECHNOLOGIES

Biological Science

The base TL for this theoretical area is the base TL for the world. If the Imports TL is higher than the local base TL, add half the difference (rounded down). Add a result from the Tech Level Modifier Table.

TL0: Useful animals and plants are domesticated. Basic principles of animal husbandry and/or agriculture.

TL1: Selective breeding of domesticated species for desired characteristics, probably with uncontrolled side effects.

TL2: Basic understanding of anatomy, possibly more detailed for animal than for sentient species. First formal description of the art of medical diagnosis.

TL3: Incremental improvements in anatomy and physiology. Crude sciences of chemistry (alchemy) and pharmacology.

TL4: Further incremental advances in biological understanding. Discovery of microorganisms, and of the cellular structure of living tissue.

TL5: Theories of heredity and evolution put biology on a rigorous footing. Early cell biology. Germ theory of infectious disease.

TL6: Biochemistry. Discovery of viruses. Growing awareness of the nature of ecosystems.

TL7: Discovery of DNA (or the local equivalent), allowing crude genome mapping. Experimental genetic engineering.

TL8: Genome mapping extends even to complex organisms. Complex genetic therapies, experimental germ-line engineering. Systems ecology (detailed understanding of specific ecosystems).

TL9: Full theory of genetic morphology allows radical modification of species. First integration of mechanical implants with peripheral or sensory nerves. Experimental nanosurgery.

TL10: Practical nanosurgery. First brain implants. Partial theory of aging.

TL11: Theory of memory. Full understanding of the brain's mechanisms.

TL12: Full understanding of the body's immune systems and aging process.



Progress

[Continued]

The Darrian case is of extreme interest to historians, who point out that many of the cultural factors present in Western Europe a few centuries earlier were also present on Darrian. Darrian culture was inherently rational, interested in extending the boundaries of knowledge. The arrival of the Solomani, with all of their diverse cultural background, brought a flood of new ideas and inspiration. Finally, the Darrians were intensely competitive in their intellectual pursuits. Indeed, the fact that they normally avoided destructive warfare meant that this competition may have been even more effective in promoting technical innovation. After all, Darrian scientists and engineers didn't have to worry about fleeing from a war or an outbreak of totalitarian government.



Economic Customs

Every human society engages in economic activity of some kind, using the available natural resources to provide basic needs and luxuries. Customs exist to help members of the society to cooperate on work projects. Other customs deal with the division of labor – men may do one kind of work, women another, children or the elderly may have other roles, and so on. How goods are distributed also comes under local custom. Most societies have some concept of property rights, defining who owns (or who controls) what things. Residence rules lay out who may live where, and how elaborate a dwelling they may have.

Exchange of goods or services involves its own system of customs, determining what things may be traded and what may not, as well as how negotiations are carried out. Most cultures also have a set of gift-exchange conventions. Customs involving the exchange of resources are often highly charged, since they tie in to questions of survival. In any culture, it can be very easy to insult someone by implying that they don't follow local notions of generosity or fairness.

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Economic Customs

[Continued]

Kinship customs often control how property is handled within a family or descent group. In some cultures, property is not held by individuals. The current leader of a descent group may control property, but it is owned by the group as a whole. In other societies, property can be inherited along lines of descent. When this happens, the question arises of how to divide an inheritance. Some societies divide property equally between all possible heirs, possibly by contributing resources to the children as they marry and form their own households. Others apply a principle of *primogeniture*, in which the first-born heir always receives the best share of family property. Another inheritance system is that of *ultimogeniture*, in which the youngest heir receives the best share. This system is often tied to a notion that the youngest child should be the one to stay in the household and care for aged parents, receiving the core of the inheritance in exchange.



Medical Technology

The base TL for this applied area is the base TL for the world or the ATL for Biological Science, whichever is less. Add a result from the Tech Level Modifier Table.

TL0: Shamanistic medicine, herbalism.

TL1: Advanced herbalism, crude surgery.

TL2: First formal description of medical diagnosis. Medical knowledge is recorded and expanded through empirical observation.

TL3: Incremental improvements in medical diagnosis and treatment.

TL4: Further incremental advances in medicine.

TL5: Experimental vaccination techniques. Reliable anesthetics and antiseptics make radical surgery practical for the first time.

TL6: Mass vaccination techniques. Development of antibiotics lead to the first reliable cures for disease. Rapid development of surgical techniques. Workable prosthetic limbs.

TL7: Advanced antibiotics. Eradication of specific infectious diseases through universal vaccination. Invasive surgery reaches its highest level of development. Major organ transplants, surgical reattachment of limbs. Experimental genetic therapies.

TL8: Lasers and microprobes make surgery minimally invasive, allowing greater efficiency and very rapid recovery. Full genetic screening and complex genetic therapies. Previously unknown infectious diseases can be analyzed and cured quickly.

TL9: Experimental nanosurgical techniques. Mechanical implants can be integrated with peripheral or sensory nerves, allowing a variety of bionic replacement organs. Clone transplants are available.

TL10: Practical nanosurgery (still too expensive for widespread use). Partial panimmunity. Neural implants can interface directly with the brain, treating certain kinds of mental dysfunction. Cheap, reliable clone transplants.

TL11: Brain implants can augment natural brain functions or modify an existing personality. Memories can be erased, implanted or modified. Crude antiagathic treatments.

TL12: Total panimmunity, reliable antiagathic treatments.

Environment

The base TL for this applied area is the base TL for the world, the ATL for Biological Science, or the ATL for Materials, whichever is least. Add a result from the Tech Level Modifier Table.

TL0: Hunting cultures may overhunt certain game animals to extinction. Primitive agriculture. Villages and towns (PR 3).

TL1: Cities (PR 4) and large-scale irrigation projects.

TL2: Large cities (PR 5), aqueducts and canals. Deliberate deforestation and swamp drainage to increase agricultural land.

TL3: Advanced agricultural techniques (crop rotation, crude fertilization).

TL4: Incremental improvements in agriculture and city planning.

TL5: Improved sanitation allows very large cities (PR 6).

TL6: Skyscrapers. Crude weather prediction. Conservationist ethic.

TL7: Megalopolitan areas appear, as mass transit allows rapid expansion of suburbs. First space stations. Advanced weather prediction. Environmentalism.

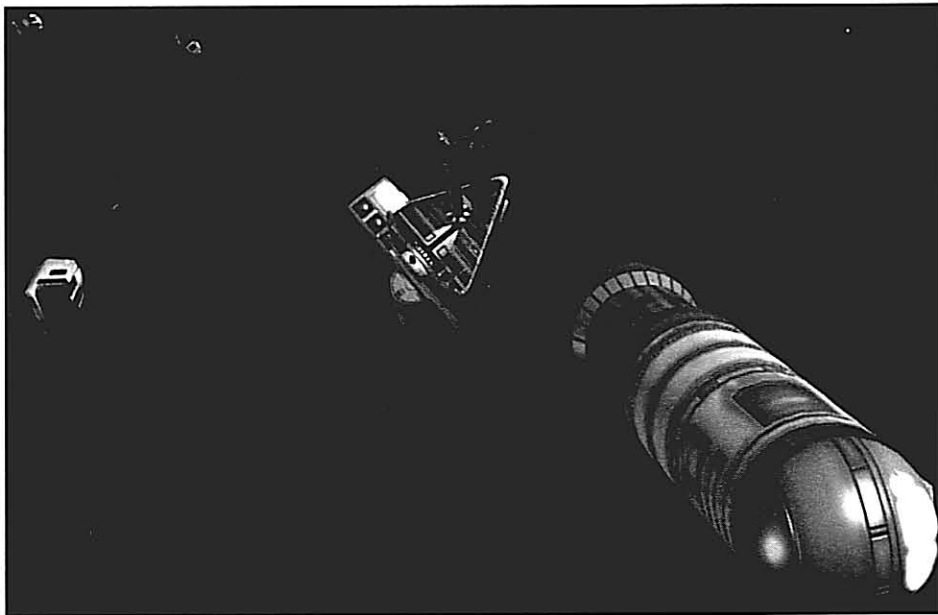
TL8: Arcologies. Large orbital settlements, with near-complete recycling efficiency. Crude weather control, long-term climate prediction. Experiments in reconstructing damaged ecosystems.

TL9: Orbital and deep-space settlements with complete recycling efficiency (microworlds). Similar techniques make arcologies common in crowded planetary urban centers. Practical weather control. Terraforming can cause gradual change in planetary environments.

TL10: Gravitic support of large buildings. Grav technology allows stationary "floating cities" late in the period. Advanced weather control. Incremental advances in terraforming techniques, advanced ecosystem reconstruction.

TL11: Advances in grav technology allow mobile "floating cities." Further incremental advances in terraforming. Whole ecosystems can now be created from scratch ("ecopoiesis").

TL12: Terraforming can produce radical and (relatively) fast change in planetary environments.



WORLD HISTORY

Any world which is going to be of importance to the campaign is likely to need a "back story," explaining how the planet was settled and what events have taken place during its history. This back story can help the GM to come up with adventure seeds for the planet, and can help him roleplay natives convincingly.

Naturally, the history of any world depends on the history of the overall campaign. Here we will give a procedure to sketch out the history of worlds in the standard setting for *GURPS Traveller* (i.e., the Third Imperium, about Year 1120). These tables will be most applicable to worlds which were part of the Vilani Empire and the Rule of Man, as well as the Third Imperium. GMs should feel free to use this as a guide for developing similar procedures for their own campaigns, or for other parts of the Third Imperium setting.

Original Settlement

Previous steps will have revealed whether a given world is the homeworld for a sentient species. If so, then the "original settlement" of the planet was long before even the First Imperium. Otherwise, the planet was at some point colonized from elsewhere. Roll 3d on the Settlement Date Table to determine when this happened. Modifiers: subtract the planet's PR, +2 if the planet is not an Eden world, +2 if the nearest other world is 2 parsecs away, +6 if the nearest other world is 3 or more parsecs away.

Hygienic Customs

The fact that human beings live close together in sheltered areas forces us to be careful of our personal grooming and cleanliness. Most societies have some concept of personal cleanliness. *Food taboos* are common, causing certain foods to be avoided (or others to be required). Intoxicating substances are often the subject of elaborate customs, which sometimes forbid their use entirely, or at other times make use of them during social or religious rituals.

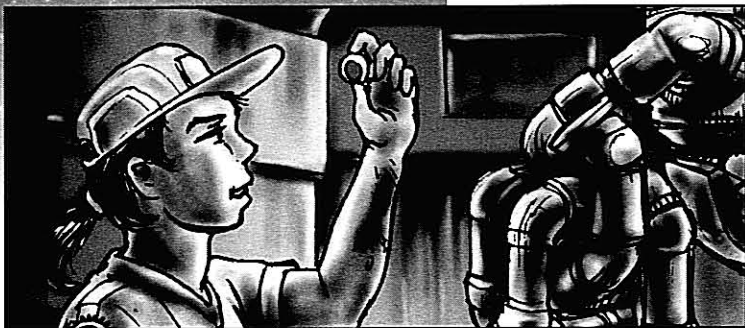
In many societies, physical cleanliness extends to a concept of *spiritual* cleanliness or ritual purity. *Pollution* occurs when the individual touches a ritually impure object or person. Biological functions are usually associated with pollution: eating, elimination, sex, menstruation, childbirth, and death. When an individual is polluted, he must undergo a ritual cleansing designed to place him back in his proper relationship with the divine. In extreme cases, there may be some form of pollution associated with almost every activity, forcing individuals to accompany every action with a small ritual.

When health fails, all cultures practice some form of formal medicine. All human cultures have some kind of pharmacology, and an array of surgical techniques. Childbirth is especially important to the continuation of the family and society, so all cultures develop customs regarding how childbirth is handled and how a new mother and child are to be cared for.

All cultures evolve a set of rituals around death and the process of dying. Such customs dictate how dying people are treated, how the newly dead are mourned, and how corpses are disposed of. These traditions are often interwoven with the society's dominant religious beliefs.

"Why did I take a transfer to Exploration? Well, a Marquis once asked me why his interests should take second place to those of a population of, quote, savages, unquote. I told him. It wasn't long before a field tour sounded like a good idea."

*— overheard in an
ISS base commissary*



Recreational Customs

Every human culture seems to develop distinctive ways to spend leisure time. Athletic sports are common, although some societies have no tradition of individual athletics (others may have no team sports). For that matter, some societies have no *competitive* sports, valuing the game itself more than the victory.

All cultures have their own dances, games, and feasting customs. Humor seems to be another universal, although what one culture considers funny will often leave outsiders cold.

Humans enjoy spending time in each other's company. Every culture has visiting customs, setting out times and places for people to socialize. Traditions of hospitality define how guests must be treated, and how they must behave while visiting. Hospitality usually involves the sharing of food or other comforts, or an exchange of gifts. These exchanges can be highly ritualized, and difficult for an outsider to handle without giving insult.

Another aspect of local culture is the prevailing style in decoration. Humans seem to need to decorate their homes and their possessions, adding beauty or symbolic importance to everyday things. Humans also decorate themselves, using clothing, hairstyles, jewelry, or physical mutilation to pursue a local ideal of personal attractiveness. Personal decoration can be a status symbol, as upper-class individuals wear more elaborate costumes or groom themselves in such a way as to demonstrate freedom from manual labor. In more egalitarian societies, upper-class individuals may avoid elaborate personal adornment so that they can appear to be "ordinary." Styles of personal adornment are among the customs that will be noticed almost immediately by any outsider, although *understanding* those styles may take much longer.

Settlement Date Table

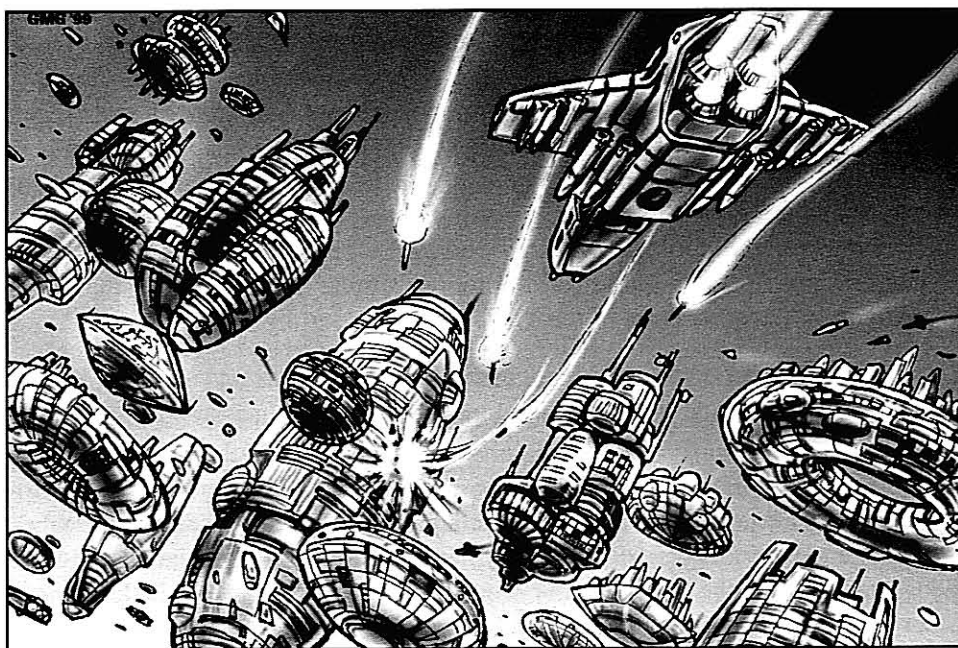
Roll (3d)	Time of Settlement
2 or less	First Imperium
3-4	Second Imperium
5	Long Night
6-7	Third Imperium (0-299)
8-9	Third Imperium (300-599)
10-11	Third Imperium (600-899)
12	Third Imperium (900-1049)
13 or more	Third Imperium (1050 or later)

The Long Night

If a planet was first settled during the Vilani Empire or the Rule of Man, it will have suffered the effects of the Long Night (from Year -1776 to Year 0). Roll 3d or choose a result from the Long Night Events Table. Modifiers: subtract the planet's PR, +2 if the planet is not an Eden world. If the result indicates that the planet's population was "wiped out" or "evacuated," then the world must have been re-colonized by the Third Imperium.

Long Night Events Table

Roll (3d)	Events
-2 or less	Significant growth and technological advancement.
-1	Moderate growth with most technology retained.
0	Population and economy remain stable.
1	Gradual decline in population.
2-3	External attacks reduce population.
4-5	Technological failure reduces population.
6-7	Social collapse reduces population.
8	Natural disaster reduces population.
9	Population evacuated to another world.
10	Population wiped out by external attacks.
11	Population wiped out by technological failure.
12	Population wiped out during social collapse.
13 or more	Population wiped out by natural disaster.



The Early Imperium

If a planet was settled (or abandoned and resettled) before about Year 600, it will have taken part in the coalescence of the Third Imperium. Roll 3d *twice* or choose two results from the Early Imperium Events Table.

Early Imperium Events Table

Roll (3d)	Events
3	Major center of activity (subsector capital).
4	Minor center of activity (scout or naval base).
5	Imperial integration was smooth and cordial.
6	World established secondary colonies.
7	Period of unusual cultural advancement.
8	Period of rapid technological advancement.
9	Period of unusual economic prosperity.
10	Roll <i>twice</i> on this table.
11	World had a legendary leader.
12	Period of internal warfare and revolution.
13	Period of conflict with a neighboring world.
14	World was battle zone during major interstellar war.
15	Original social or political structure collapsed.
16	Integration after long series of minor conflicts.
17	Integration after major or devastating conflict.
18	Devastating natural disaster.

Recent Events

If a settlement is only a few years old, it won't have gone through any significant historical events as yet (the colonists are still busy settling into their new world). The GM may roll 3d on the Recent Events Table, one or more times depending on how "exciting" he wants recent history to have been. The resulting events will have taken place within the last two generations (about 50 years).

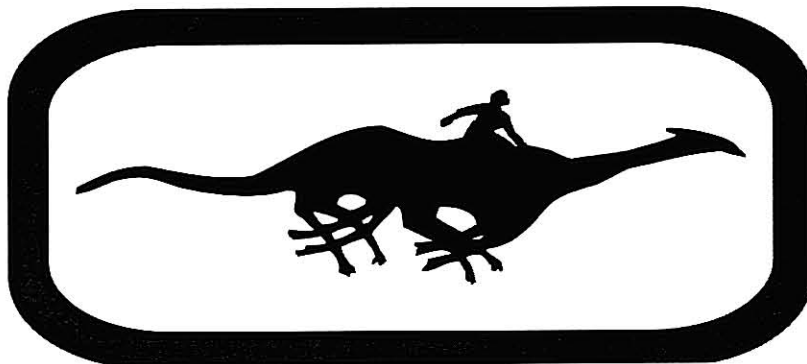
Recent Events Table

Roll (3d)	Event
3	Natural disaster.
4	War with another world or society.
5	Civil war or insurrection.
6	Economic depression.
7	Minor economic depression or recession.
8	A strong or heroic leader boosts public confidence.
9	Period of economic prosperity.
10	Roll <i>twice</i> on this table.
11	Period of cultural advancement.
12	A series of scandals reduces public confidence.
13	A weak or unwise leader reduces public confidence.
14	Outbreak of social protests and political activism.
15	Outbreak of terrorism or other civil violence.
16	Massive riots and civil disorder.
17-18	Major new political, social or religious movement.

Metaphysical Concerns

Every human culture develops its own set of beliefs about the universe around it. *Cosmological* beliefs involve the nature of the universe: why it exists, how it is structured, what powers cause events to happen, and so on. *Eschatological* beliefs involve destinies and "last things," such as the nature of death or the fate of the world. Meanwhile, most societies have beliefs about human nature, such as a concept of the soul.

Naturally, every society has beliefs about how human beings can influence events. To predict the future, methods of divination are developed, some of these leading to omen-interpretation or "luck superstitions."



To actually direct the future, most societies develop some system of *magic*, hoping to influence the supernatural beings or other "powers" that are believed to cause events. These systems of ritual magic can become very elaborate, shading into systems of religious ritual. Even technically advanced societies have their own superstitions and religious beliefs.

GURPS Religion includes an extensive discussion of various systems of magical and religious belief. Any GM interested in developing unique metaphysical beliefs for his alien cultures should refer to that book.

Survey and Exploration

What's the Difference?

In the Third Imperium, the popular image of the Scout Service is as a band of intrepid explorers, but the truth of the matter is that the IISS does a great deal more *survey* work than actual exploration. The Service makes a clear distinction between the two concepts.

Exploration involves the investigation of genuinely new and unknown territory. Explorers may have a rough map of a star system, from very old library data or from remote observations, but that is all. Their job is to gain a working knowledge of the star system and its contents, from scratch. They discover system bodies, place navigation beacons where none exist, visit habitable planets for the first time, open contact with the natives. Explorers must be prepared for anything.

Survey involves the mapping of territory that is already (more or less) well-known. When an IISS survey ship enters a star system, it already has a map that is normally no more than a few decades old. It expects to find navigational beacons already in place. The work involves verifying details, updating maps, and replacing worn-out beacons. Naturally, conditions *do* change between surveys in every star system, especially if it is inhabited. Such changes tend to be incremental rather than radical. Surveyors rarely face (or are prepared for) surprises.

Explorers will use all the procedures in this chapter. Surveyors will often stop with a surface map of major worlds, gathered from orbit. If surveyors visit an inhabited world, it is usually as a courtesy call or for shore leave.

Many of the information-gathering tasks described in this chapter are *uncertain* in nature. The character undertaking them can never be completely certain that he has succeeded or failed. The simplest way to handle such tasks is for the GM to make skill rolls for the players in secret (see p. B87). On a success, he will truthfully tell the players part or all of the information they are looking for. On a failure, he can conceal the truth or even mislead the players.

Bear in mind that players' tolerance for "scientific roleplaying" will vary. Some will find the gathering of scientific information interesting, especially if the GM avoids making it a dry die-rolling exercise. Others will want to skip to the action. The following should be considered *suggested* rules for playing out IISS activities. The GM should feel free to abstract or skip as much as he pleases to satisfy his players' taste.

SURVEY OPERATIONS

Survey operations involve a general evaluation and mapping of the worlds in a target star system. Many of the tasks involved in a system survey require using Electronics Operation (Sensors) to gather information, and a Scientific skill to interpret the information. In these cases, make the Sensors roll first. On a success, the follow-up science skill roll is made unmodified (with a +3 bonus on a critical success for Sensors). On a failure, some of the data gathered are incorrect, but a correct picture can still be built up with greater difficulty, with a penalty equal to the amount the Sensors roll was missed by. On a critical failure with Sensors, the follow-up skill roll may not be made until another attempt is made to gather data. Normally, any listed modifiers only apply to the science roll.

SYSTEM DETECTION

Survey operations in a new star system begin long before the scout ship first jumps into the system. The first step is to get an impression of the contents of the target star system. This is normally done from one or two parsecs' distance.

Detecting Planets

Ship-based sensors are limited in their ability to detect planets from interstellar distances. A survey ship in flight can't use some of the indirect methods that are available to planet-based astronomers. The only available method is to try to capture images of the planets themselves, a difficult task even at high levels of sensor technology. Planets are small and dim, and they tend to huddle close to their large, bright primary stars . . .

Locating planets will take one day of observation time from one set of astronomical instruments (a "survey module" on a starship has four sets, so four attempts can be made at the same time). To perform the actual detection, roll against Electronics Operation (Sensors). Modifiers: +1 if at 1 parsec range, -1 if at 2 parsecs, -2 at 3 parsecs, -3 at 4 or 5 parsecs, -4 at 6 parsecs.

If the Sensors roll succeeds, large gas giants (50,000 miles or more in diameter) will be detected. Success by 2 or more will detect small gas giants as well. A critical success will detect the presence of large terrestrial planets (6,000 miles or more in diameter). The GM should never feel obligated to reveal the presence of all planets. Some of them may be in positions that make them impossible to detect, behind the primary star or presenting an unlighted face to the observer.

If any planets were detected, roll against Astronomy to produce a rough system map. Modifiers: +4 if more than one planet was detected. On a success, the astronomer can locate the ecliptic plane of the target system (the plane most of the planets will orbit in). He will also have a rough estimate of the orbit for each planet sighted.

Detecting Civilizations

Another task that is undertaken at this stage is to "listen" for signs of intelligent life. Detecting a civilization will take one day of observation time from one set of astronomical instruments. This observation cannot be "piggybacked" with the work for detecting planets, since the techniques involved are completely different. At interstellar ranges, only civilizations at TL7 and above can be detected using shipboard instruments.

Roll against Electronics Operation (Sensors) to detect signs of civilization. Modifiers: +1 if at 1 parsec range, -1 if at 2 parsecs, -2 at 3 parsecs, -3 at 4 or 5 parsecs, -4 at 6 parsecs.

On a success, the scouts will detect any population of at least 10 billion at TL7, 1 billion at TL8, 100 million at TL9-10, or 30 million at TL11-12. If the Sensors roll is made by a significant margin, smaller populations can be detected, down to one-tenth the size on a critical success. Also on a critical success, the process will gather 2d hours of language samples (see *Precontact Assessment*, below). Even if no detectable civilization is present, the GM should roll for the attempt anyway in case of a critical failure.

SYSTEM MAPPING

When the survey ship jumps into the target system, the crew may have only a rough idea of what planets are present and where they are. They must immediately establish their location in the system and pin down the exact positions of all major bodies. Once that's done, a more detailed study of the system's worlds can be done.

Establishing Location

This task is normally undertaken by the ship's navigator, using a roll against Astrogation. Modifiers: +4 if the ship has a command bridge, +2 if a rough system map is already available (either from library data or from astronomical observations at interstellar range).

On a success, the ship's position has been established with enough accuracy to allow further survey operations to proceed normally. On a failure, the navigator was inaccurate and all system-mapping skill rolls will be at a -1. On a critical failure, the inaccuracy is greater (-3 penalty). These penalties will last until the first success in a system-mapping task (the error was noticed and corrected).

Locating Planets

In one sense, mapping a star system from the inside is much harder than detecting planets from an interstellar distance. From a few parsecs away, it's easy to know which way to point the telescope. From inside the system, the entire sky needs to be covered.

The Gory Details

The rules in the main text are a workable system for IISS operations, assuming a scout ship is following standard procedures using the instruments in its TL12 survey module. GMs may want to vary the rules under special circumstances, at other tech levels, or in non-Imperial campaigns. Here are the assumptions which can be used to estimate the difficulty of exploration tasks in other cases.

To detect or study an astronomical object, sensor contact must be made with it. This requires a roll against Electronics Operations (Sensors). The effective skill used in the roll is modified by the Resolution modifier for the sensor suite, a Size modifier, and a Range modifier. If the sum of these modifiers is -10 or less, the task cannot be completed no matter how high the effective skill is (the sensor just isn't good enough). If the sum of the modifiers is +10 or more, then *sighting* of the object is automatic, although the skill roll should be made anyway to determine the degree of success.



Resolution Modifier: This modifier is based on the Scan factor, as laid out in the sensor rules from *GURPS Vehicles*. The difference is that astronomical instruments are optimized for scientific observation, and have a different performance profile than sensors used for weapons targeting. When the instruments are being used to affect vehicle action, use the rules from *GURPS Vehicles*.

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The Gory Details

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Naked eye: When doing astronomy using *no* instruments, substitute a Vision roll for Electronics Operation (Sensors). The Resolution modifier is +10 (reflecting the fact that astronomical objects tend to be bright against a black background).

Telescopes: Ordinary telescopes are available from TL4 on. They use lenses and mirrors to gather and focus light for the human eye. Again, substitute a Vision roll for Electronics Operation. Resolution modifiers are based on the magnification factor of the telescope (actually, several other properties of the telescope are involved as well). A partial table of Resolution modifiers is below.

Magnification	Resolution Modifier
×1.5	+11
×2	+12
×3	+13
×4.5	+14
×7	+15
×10	+16

If a telescope's magnification is between two values, use the lower. For higher magnifications, extend the above table by adding +6 for every factor of 10 magnification. For example, a telescope which provides x30 magnification is ten times better than one that provides x3, so its Resolution Modifier is $13 + 6 = +19$.

When using a telescope to *search* for an object that hasn't already been sighted, magnification can be a hindrance (it reduces the field of view). In this case, any Resolution bonus due to magnification (anything above +10) should be halved, rounded down. For example, a telescope which provides x200 magnification is being used to search for a specific planetoid. Its base Resolution bonus is +24. The bonus due to magnification is +14, which is halved to get +7. For this search, the Resolution bonus is only +17.

Advanced Telescopes: At TL7 and above, astronomical instruments become far more effective due to electronic light amplification and digital image enhancement. Assume that the Resolution modifier is the same as for an ordinary telescope with the same magnification, but with a further TL-6 bonus. Double this bonus if the instrument is trained on the same target for at least one day. The undoubled bonus *can* be used in search mode.

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To produce a workable system map requires *ten days* of observations. Multiple sets of astronomical instruments can be used by a team of astronomers to reduce this time (two sets require only five days, for example). Roll against Electronics Operation (Sensors) to locate system objects. Modifiers: +2 if a rough system map is already available.

The mapping process will automatically detect all of the gas giants. On anything but a critical failure, all of the terrestrial planets will also be detected. On a success, all large moons in the system will appear. On a critical success, some of the small moons and larger planetoids will be detected, allowing the placement of planetoid belts.

The follow-up Astronomy roll is needed to produce a working system map. On a success, gas giants and terrestrial planets will be immediately identifiable, and the GM may reveal the specific type of some terrestrial worlds depending on the level of success. On a critical success, specific world types will be revealed. The approximate orbital radius will be available for each mapped system object, which will yield the approximate period assuming low orbital eccentricity. An accurate assessment of all orbital parameters for a given object requires observations over a longer interval, say at least one-tenth of the orbital period.

Detecting Civilizations

Once in the target system, it's relatively easy to detect native civilizations. Radio transmissions will be very clear, and spacefaring cultures can also be detected by visual observation of spacecraft and installations. Even an early industrial civilization can be detected by spotting the large-scale environmental changes it causes. Detection again requires one day of observations, using a dedicated set of astronomical instruments. Civilizations at TL5 and up can be detected at this range.

Roll against Electronics Operation (Sensors) to detect signs of civilization. On a success, the scouts will detect any population of at least 10 billion at TL5, 1 million at TL6, 100,000 at TL7, 10,000 at TL 8, 1,000 at TL9-10, or 300 at TL11-12. Again, if the Sensors roll is made by a significant margin, smaller populations can be detected, down to one-tenth the size on a critical success. A critical success will gather 2d hours of language samples. The GM should always roll, even if no detectable civilization is present or detection is automatic.

PLANETARY SURVEY

IISS expeditions don't always examine every world in a target system closely. Any planet in the habitable zone, however, is likely to get attention. Standard procedure is to do an initial evaluation of the planet while still at some distance (4 or 5 million miles), then move in to close orbit for a detailed survey and mapping sweeps.

Initial Evaluation

It takes very little time to establish a planet's general parameters. An hour's observations with a single set of astronomical instruments will suffice. Roll against Electronic Operations (Sensors) to use the array properly, then roll against Planetology (using the appropriate specialty) to interpret the results.

Success on this task will yield a great deal of information about the planet: its exact size; the presence of any small moons; the planet's rotation period and axial tilt; its exact world type; the approximate atmospheric pressure at the surface; the general composition of the atmosphere (some impurities may be missed); the approximate hydrographic percentage; the approximate climate range and weather factor.

The GM may want to reveal only part of this information if the Planetology roll failed or was only barely successful. If the pace of play would not suffer, he may have the players make multiple Planetology rolls to discover this information in pieces.

Orbital Mapping

To map the surface of a terrestrial world, an IISS ship takes up a close orbit (about 200 miles above the surface) and begins applying its planetary survey arrays. There are four such arrays in each survey module, but they are normally used in concert, each survey expert supporting and verifying the work of others.

The best orbit for mapping is some variation of the "ball-of-yarn" orbit. The scout ship orbits at a very high inclination to the planet's equator, actually passing over the north and south poles on each circuit. As the planet rotates, the ship finds itself always passing over new terrain, eventually scanning every portion of the planet's surface. If the planet is too small or its rotation is too slow, the ship may alter its trajectory slightly on each pass to get the same effect. Taking up an effective ball-of-yarn orbit requires a Piloting roll. The entire mapping process takes a number of hours equal to the diameter of the planet in thousands of miles, *squared* (minimum of 2 hours).

Sometimes the initial survey evaluation needs to be done from a greater distance. IISS policy with regard to interdicted worlds forbids casual close-orbit approach, for example. If the initial survey is done from high orbit (about 2,000 miles) then each Sensors roll is at -6, but the mapping survey takes the same amount of time.

To gather data for the survey, each surveyor must make an Electronics Operation (Sensors) roll. If at least one surveyor succeeds, a Cartography roll is needed to assemble the survey data into a working planetary map. Modifiers: +2 for each surveyor who succeeded in his Sensors roll, after the first.

A complete survey map will give a complete visual and thermal map of the surface, resolving features down to about 100 feet across. If there is no reason to avoid using active sensors, the survey will also yield a synthetic-aperture radar map of the planet, including nearly exact elevations. Densitometer scans will give some idea of what lies under any oceans, giving a rough map of the seafloor. The GM may simply wish to share the planetary map with the players at this point.

Further, the close-orbit survey will allow the expedition to make precise measurements of the world's gravity. This will yield the planet's exact mass, density, and surface gravity, and will allow the precise computation of the orbital parameters for its moons. Very precise measurements of changes in the world's gravitational field, combined with densitometer readings, will yield information about the structure of the planet's interior.

Detecting Civilizations

The orbital mapping survey is the last chance the scout team has to detect native sentient life, short of actually landing on the planet. Unlike the searches from long range, this can be done using the same data used to create a planetary map. At this range, sentient species can be detected even at TL0, while civilizations at TL6 and up are detected automatically. Once the mapping sensor results are in, make another Cartography roll. Modifiers: +2 for each surveyor who succeeded in his Sensors roll, after the first.

Success in this roll will detect any population of at least 10 million at TL0, 1 million at TL1-4 or 100,000 at TL5. Again, if the Sensors roll is made by a significant margin, smaller populations can be detected, down to one-tenth the size on a critical success. Note that some populations may be harder to find even at

The Gory Details

[Continued]

For example, the instruments in the standard IISS survey module (see p. 35) are TL12 advanced telescopes with x10,000 magnification. Their base Resolution bonus is $10+24+6 = +40$ (+28 in search mode). If a full day's observations are available, the Resolution bonus rises to +46 (still +28 in search mode).

Size Modifier: For most astronomical objects, the Size modifier is a function of the linear size of the object, as in the *Basic Set* and *GURPS Vehicles*. Typical Size modifiers for purposes of astronomy are as follows:

Object	Size Modifier
Small planetoid (10 miles)	+29
Large planetoid (100 miles)	+35
Average moon (1,000 miles)	+41
Small planet (3,000 miles)	+44
Large planet (7,000 miles)	+46
Small gas giant (30,000 miles)	+50
Large gas giant (70,000 miles)	+52



Note that most of the astronomical tasks don't involve searching for *stars*. If the situation comes up, stars should probably be given a substantial bonus due to their intrinsic brightness. A supergiant star, for example, can be spotted by the naked eye at a distance of thousands of parsecs!

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The Gory Details

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Range Modifier: This modifier is taken directly from the chart in the *Basic Set*, extended to astronomical distances. Again, to extend this table add or subtract +6 for every factor of 10 in range.

Range	Range Modifier
1 million miles	-53
10 million miles	-59
1 AU (100 million miles)	-65
10 AU	-71
1 parsec	-97
2 parsecs	-99
3 parsecs	-100
4 parsecs	-101
5 to 7 parsecs	-102
8 to 10 parsecs	-103

Each of the tasks described in the main text involves a specific set of instruments, target object, and standard range. From these, the final skill modifier for the task can be determined.

Locating planets at interstellar distances: Technically, this involves "searching" for an object not already sighted, but in this case the astronomer already knows where to point his telescopes. At a range of even one parsec, planets will appear so close to their primary star that they will appear in the same field even at full magnification. Use the full Resolution bonus of the instruments.

Building a system map: Here, the astronomer is at much closer range (the main text rules simplify by assuming about 2 AU from anything of interest). However, he no longer knows where to find system objects – when his ship emerges from jump, the planets can be anywhere in the sky from his point of view. The telescopes must therefore be used in search mode. The figure of ten days to finish the task is taken from *GURPS Vehicles*.

"Baseball. It's a game. Solomani, pre-starflight. I don't know if anyone still plays it. I started studying it a couple of years ago. There's a lot of statistics and record-keeping involved. Just the thing to fill in the time during Xboat jumps. It's either that or stare at the walls."

– Marc Lurashu,
Communications Office

this range (if they routinely live underground, for example). TL0 species that are on the border of sentience will have made very little impact on their environment, and may be impossible to distinguish at a distance from nonsentient animals.

If sentient life has been detected now or at any earlier point, then a successful Cartography roll will locate any major population centers. Even a culture lacking cities will have regions of unusually dense population (hunting ranges or good agricultural land) and these can be placed on the map.

EXPLORATION OPERATIONS

Once the initial survey of a new world has been completed, the IISS gets down to business. Real understanding of any new world requires that scouts go down and get their hands dirty. After all, every new planet is a *world*, the end product of billions of years of isolated evolution, full of traits unique to itself.

Geological Survey

General information about planetary geological formations will be available due to the orbital mapping pass. More detailed maps of local terrain can be generated by low-altitude mapping flights. During these, a ship's auxiliary craft or grav vehicle passes over the terrain at a height of about one mile, using visible-light cameras, IR sensors, radar, and densitometer readings to build an extremely detailed map. Assume that one team can cover about 5,000 square miles a day. The task requires a lot of routine Piloting and Electronics Operation (Sensors) use, but the GM may not want to bother with skill rolls under normal circumstances. To assemble the final detailed map of any given area, a Cartography roll is required.

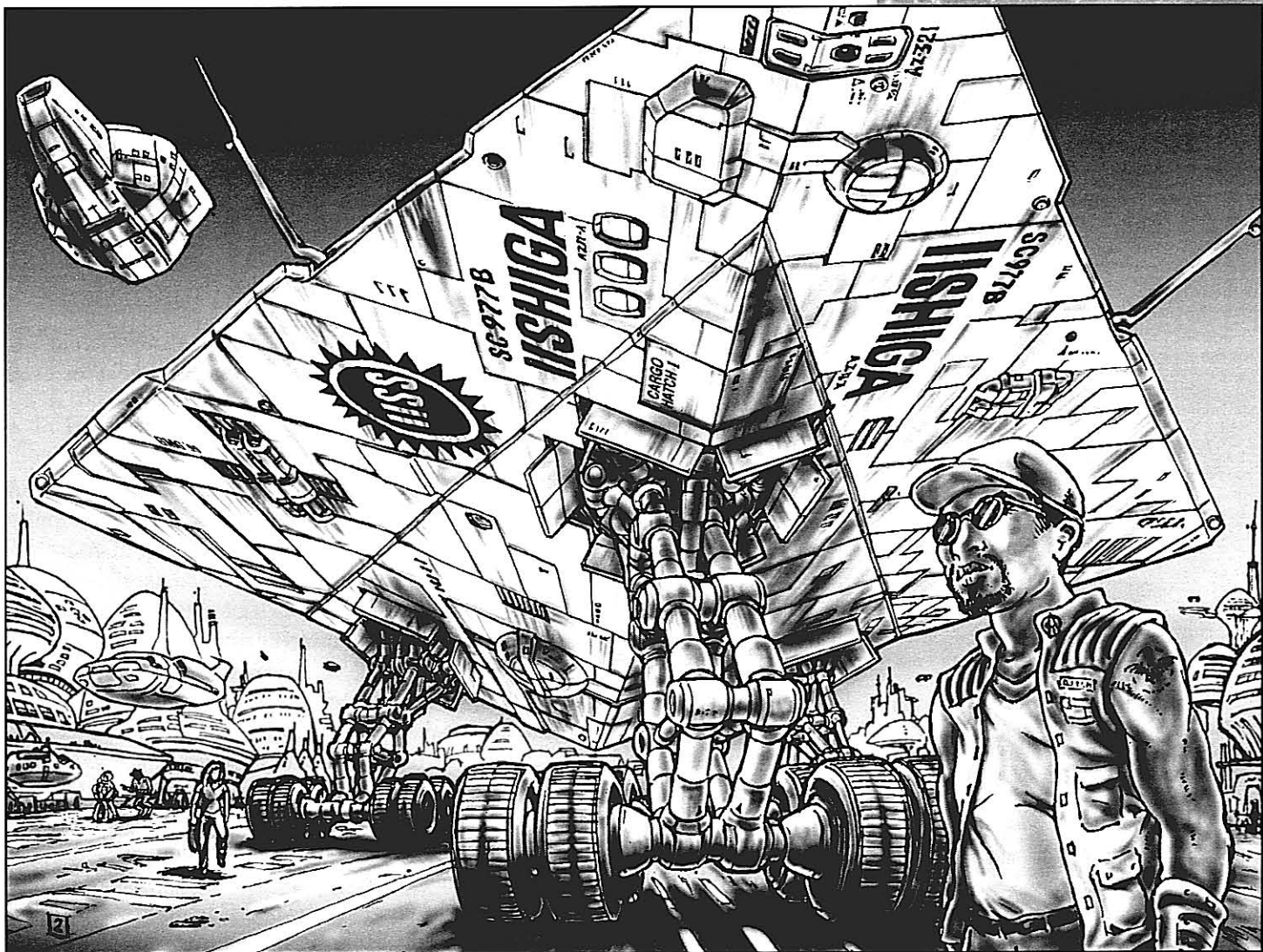
The detailed terrain map will give some information about subsurface geological formations and ore deposits, but getting a complete picture requires on-site inspection. In a given region, a geologist will drill core samples in carefully chosen locations, and will also use seismometers and a portable densitometer. This process requires 1d days for an area of about 500 square miles. The geologist must succeed in rolls against Electronics Operation (Sensors) and Geology. On a success the geologist will understand the broad outlines of local geological history, and will know whether there are any valuable mineral deposits in the area. Actually locating those deposits will take more time (and may not be a task for the exploration team in any case).

Biological Survey

Meanwhile, if the world's ecosphere includes at least "simple animals," biologists will fan out to gather information about native life forms. Such a biological survey takes about 1d days per region and terrain type covered.

During the biological survey, the scouts will collect samples of plant life and soil for later analysis. They will also try to study at least three examples of each major animal category (herbivore, omnivore, carnivore) in each terrain type. Small animals can be captured for intensive study. Large creatures will be anesthetized or killed, so that gross anatomic studies can be done and tissue samples can be taken. The scouts will also try to make holographic records of as many species as possible, exhibiting normal behavior in their natural environment.

Assume that a biologist working in the field must make a Botany, Xenobiology or Zoology roll to complete each task during the survey (evaluate a set of soil or plant samples, record the physiology of an animal specimen, and so on). Photography skill may be useful in taking holographs of species. Capturing or hunting animal specimens should be played out as a set of mini-adventures, using as much detail as GM and players are comfortable with.



Some local life forms are not affected by standard tranq rounds. Tangles are often used to restrain large specimens when tranq is not available (see p. UT23). Another alternative is to formulate a new tranquilizer for the local biochemistry. This requires that tissue samples or whole specimens be gathered from at least 1d+3 local animal species, at least one of which should be large. A successful roll against Biochemistry will yield a tranq formula specific to local animal life, which can be synthesized in the nearest lab facility using Chemistry skill.

Ecological Survey

The biological survey will yield enough information to get a broad view of a world's natural history. Major animal and plant orders will be understood and the most prevalent large species will be identified. To get a real understanding of how local ecosystems work, however, a full ecological survey is necessary.

An ecological survey takes 2d standard years to complete. The surveyors must painstakingly identify local species down to the smallest animal and plant forms. Further, the team must observe how all of these species interact over several local years, to make sure that any seasonal changes are noticed and understood. The survey will involve many rolls against various biological-science skills, especially Ecology.

IISS doesn't always perform the ecological survey itself. If the world is to be turned over to a colonization effort, then the Service may leave the full

Is Anyone Home?

The rules for detecting civilizations are similar to the astronomy rules in the previous sidebar. The "Size" modifier is calculated using different assumptions, however. Instead of indicating a physical size, it indicates how obvious the target civilization is from a distance (the "signature"). It is the sum of two modifiers, one based on the TL of the target civilization, and one based on its *population*.

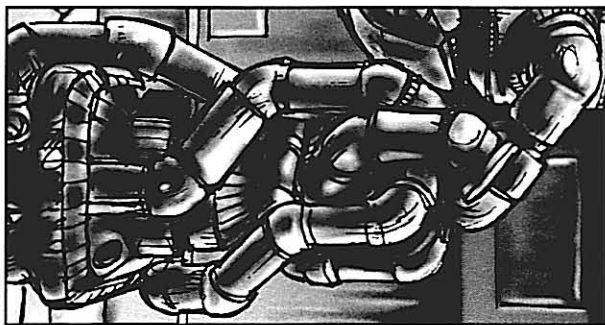
The most important factor is the base TL of the target civilization. Cultures at TL6 and above generate radio emissions that can be detected from a great distance. At TL7 and up, nuclear power and spacecraft drives create neutrinos that can sometimes be detected against the background neutrino flood from the primary star. At TL9 and up, reactionless thrusters and gravitic technology produce their own characteristic radiation. Finally, high-tech cultures tend to *build things*: lighted cities, space stations, terraforming projects

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Is Anyone Home?

[Continued]

Target TL	Signature
0	-2
1-4	+4
5	+10
6	+34
7	+40
8	+46
9-10	+52
11-12	+55



Populations numbering in the millions or billions will be more obvious from a distance. On the other hand, colony worlds with only a few thousand people present will be hard to detect until the scouts are in the same system, no matter how high the local technology.

Target Population	Modifier
100 or less	-36
1,000	-30
10,000	-24
100,000	-18
1 million	-12
10 million	-6
100 million	+0
1 billion	+6
10 billion or more	+12

Note that these factors follow the usual “+6 for a factor of 10” rule. If you want more detail, add +1 for a factor of 1.5x, +2 for 2x, +3 for 3x, +4 for 4.5x, and +5 for 7x.

Add these two factors together to get the effective Size modifier of a given civilization. When trying to detect a civilization, always use the full Resolution bonus for the instruments. Even insystem, once planets are located it’s easy to know where the best places to search are.

At short ranges, high-powered astronomical telescopes are no longer the most useful instruments for finding civilizations. Instead, explorers use planetary survey arrays from orbit around the target world. Assume that a standard array (called a “high-resolution array” in *GURPS Vehicles*) has a Resolution bonus of +36 for this purpose.

ecological survey for the colonists to do. If the scouts do perform the survey themselves, possibly in conjunction with long-term liaison activity (see below), then a large team of Exploration Branch scouts will be posted to live on-world for the duration of the survey.

CONTACT PROCEDURES

Once the scout team has determined that sentient life is present, the question of contact arises. This section describes typical contact procedures for the IISS.

PRECONTACT ASSESSMENT

Scouts almost never go in to contact a new society “cold.” If possible, the scout team will study the natives for weeks or even months from hiding.

Linguistic Assessment

The most important precontact task is a study of the local language. If the native society is at a low tech level (TL0-5), samples of the language must be gathered via direct monitoring of conversations. This is normally done using stealth reconnaissance drones (see p. 31) placed in inhabited areas. At TL6 and up, it becomes possible to gather samples by monitoring radio communications from orbit.

Stealth drones are almost impossible for a low-tech society to detect in flight, but at higher tech levels the local sensor network begins to have a chance at detection. In any case, it’s more difficult to deploy drones where they will have a good vantage point and yet will not be discovered accidentally. Use the appropriate Piloting skill to deliver a stealth drone undetected to the observation zone, at a -1 penalty for each native TL above 6. A failure indicates that the flight had to be aborted, a critical failure indicates that the probe was lost or shot down. Once the drone has reached the target area, use Camouflage to find a good place from which it can eavesdrop. Robotic drones may use their own skills rather than those of the remote pilot.

Radio monitoring can be done without undue risk of detection. Use Electronics Operations (Communications) to tap into the local radio net using a ship’s communicators. At higher tech levels the signals themselves may be hard to interpret. As analog signals give way to digital (in late TL7) the eavesdroppers must first break the “protocols” encoding voice, video, or text data. This requires several hours’ worth of samples and a Cryptanalysis roll, at -2 for each native TL above 8. The Cryptanalysis skill has a number of modifiers of its own (see p. B245).

Each flight of a stealth drone can gather 1d-2 hours of useful language samples (minimum 0). Each ship’s communicator can gather one hour of useful samples per two hours of monitoring. The GM should determine how many hours of samples will be needed before a working knowledge of the language can be derived. If the language is related to a known language (as for a lost colony of some kind) then 2d hours of samples may be enough to “break” the new dialect. If the language is completely unknown, then at least 100 hours of samples will be needed, possibly more if the language uses unusual syntax (if the language skill is Mental/Hard, for example).

In any case, Linguistics rolls are needed to analyze the samples properly, and to create a database for the new language. At this point, the database is incomplete and will not permit anyone to spend more than half an experience point on the new Language skill (IQ-2 level, in most cases).

Sociological Assessment

Once the local language has been “broken,” the contact team must make an initial estimate of the local cultural parameters. Again, this is based on information gathered through stealth reconnaissance and radio monitoring. However, even if the language was trivial to break it will take an extensive collection of samples to gain insight into the local culture. The rules below assume that enough language samples have been gathered to build a working language database, or a minimum of 100 hours of samples. If less than this is available when the sociological assessment is made, apply a -1 penalty to each skill roll for every 10 full hours of deficit. Extra samples give +1 bonuses for every 20 full hours of surplus. Video samples or stealth-drone photography will count double if they *show* natives interacting socially.

Technology Level: Probably the easiest parameter to assess from a distance is the level of technological advancement. The overall Tech Level for the society should be obvious by the time the language database is complete, without need for any skill rolls. To determine the precise Tech Levels for individual sectors, make History rolls. The GM may apply bonuses to some of these if he judges that a given technology sector is in common, visible use (most will be, as few societies hide available technology away).

Political Structures: During this phase, the team can probably determine the basic political structure. The language will include words relating to politics, and examples of those words in context will give clues to how power is structured. When applied to intercepted communications, the Traffic Analysis skill will help the observers to reconstruct patterns of power and authority by seeing who communicates with whom. Covert observations of political activity will give clues to who makes decisions, and how. Roll against Anthropology or Xenology to determine the overall political type and Control Rating.

Specific Political Institutions: The overall political type may be fairly easy to determine, but the *details* are not always obvious. At this point, the team is most interested in some specifics of local law. After all, any kind of public behavior that tends to get natives arrested will be important for a landing party to keep in mind. Roll against Anthropology or Xenology at -4 to determine what local laws will require special attention.

Cultural Parameters: Each of the eight cultural parameters can be estimated at this point, based mostly on observed behavior. Roll against Anthropology or Xenology for each parameter, giving a general assessment (high, moderate, or low) on a success.

Instead of resolving the precontact assessment through simple die rolls, the GM may wish to game out the process in more detail. In this case, once the language database has been built (or even before), the GM may provide clues to social parameters by describing the scout team’s observations.

For example, rather than rolling dice and telling the players “the society has high Pluralism,” the GM may describe a crowded city square, observed by a stealth drone. Dress and appearance are diverse. Some of the natives are apparently putting on a political demonstration, with signs and chanted slogans, but although there are angry expressions no one is moving to stop it. Indeed, some natives in uniform are apparently protecting rather than arresting the dissidents. Of course, some of the PCs’ observations may be misleading . . .

This kind of treatment can give the PCs more latitude to direct the investigation, perhaps using other skills to ferret out specific pieces of evidence. Once the players have drawn and stated their conclusions, the GM can make skill rolls, granting bonuses if the players have been perceptive, penalties otherwise.

The Fermi Paradox

In the early 20th century, a scientist named Enrico Fermi remarked on the strange fact that there was no evidence of extraterrestrial life. He reasoned that the universe was very old and vast, and there had been plenty of opportunity for some sentient species to attain starflight and overrun the Galaxy. Yet Terra had apparently never been visited, and astronomers had found no evidence of other civilizations out among the stars. Fermi concluded that there *were* no starfaring civilizations, that intelligence itself was so rare that humans might well be the only sentient inhabitants of the Galaxy.

In the *Traveller* universe, of course, Fermi turned out to be wrong. Yet scientists and philosophers of the Third Imperium have grown aware of a new “Fermi paradox” of their own. There are hundreds of sentient races within known space, and presumably many more throughout the Galaxy. Interstellar travel isn’t *that* hard to accomplish. So why does it seem that there are no other “islands of civilization” elsewhere? A TL12 civilization with a few billion citizens should be detectable thousands of parsecs away, to a determined search. Yet beyond the borders of Charted Space, the Galaxy seems to be silent and empty.

One possibility is that starfaring species normally destroy themselves quickly. Certainly the Ancients seem to have done so, and human history has had its own lapses. Alternatively, perhaps after a period of starfaring, a few thousands or tens of thousands of years long, species tend to turn inward and lose interest.

Another possibility is that advanced civilizations tend to *hide*. Instead of pouring radio and other emissions out into the Galaxy, they try to blend in to the background, using tight-beam communications and avoiding the kind of big engineering projects that could be detected over interstellar distances. The major races of Charted Space have never bothered to do this, but other cultures may have different priorities.

Of course, some have suggested that there may be *good reasons* for a high-tech culture to keep a low profile . . .

GURPS Traveller GMs may wish to surprise their players with such “hidden” civilizations. Assume that any civilization above TL6 can reduce its “signature” to that of a TL6 culture. More advanced technologies generate more emissions, but can also hide them more effectively. Note that civilizations which are trying to hide will also restrict their populations, making them even harder to detect.

When Things Go Wrong

The IISS is painfully aware of the 57th Century equivalent of Murphy's Law: "Anything that goes wrong will do so at the worst possible time."

A contact team, in particular, may find itself suddenly needing rescue. When that happens, the gloves come off and Security Branch goes into action.

During covert or first open contact, it's standard procedure for a squad of Security Branch troopers (called the "watch team") to be on call. While the Alpha or Beta Team is armed lightly if at all, the watch team will be ready to apply overwhelming force. The watch team will most likely be in Scout Expedition Dress (see Chapter 3) and will be armed with whatever weapons would be necessary to overcome native resistance. This may include nonlethal weapons, if the local technology is backward enough.

The watch team waits out of sight of the contact point, in the wilderness or in low orbit, as close as they possibly can without being immediately discovered. The watch team stands by at all times throughout the contact procedure. If this period is likely to be more than a few hours long, extra Security Branch operatives will relieve the first watch team on a regular basis so that the team on call is always alert.

If the contact team yells for help, the watch team responds. The emphasis is on rapid mobility and the attainment of surprise. Ideally, the watch team reaches the trouble spot within five minutes of being called, much less if it's able to stand watch close by. The watch team's job is to apply exactly what force is necessary to overwhelm those threatening the contact team and get all IISS personnel to safety – not an ounce less, and not an ounce more.

Once the contact team has met with local officials, and there appears to be no immediate danger of attack, the watch team stands down to a lesser state of readiness. They will be moved back to a position that's safer from accidental discovery, possibly to the expedition's base camp or starship. If SED suits are in use, the watch team will wait without wearing them, ready to don them if needed. A prudent expedition leader will keep a watch team formally ready for action any time that a contact team is in the field, long after contact has given way to routine liaison work.

COVERT CONTACT

Once the precontact assessment is finished, the commander of the scout team may authorize covert contact. This is not intended to open communications with the new culture. Instead, the scouts involved will be sent to gather more information *without* revealing themselves to the natives.

Procedures

The "Alpha Team" assembled for a covert-contact mission will include specialists in anthropology, xenology, and linguistics. At least one member will be highly trained in negotiating skills. There will also be at least one security specialist, armed with concealed weapons.

Members of the Alpha Team will carry translators (see p. 28), but IISS policy demands that all members of the Alpha Team also have some exposure to the native language and customs, as gathered from the precontact assessment. Effectively, this means that every member must have spent a half-point (the maximum possible at this time) on the native Language skill. Unless the GM is using Quick-Learning rules (see p. CI114), this implies 100 hours of study. Characters with Language Talent or high levels of Linguistics skill will be very useful in an Alpha Team.

If possible, Alpha Team members are provided with clothing and items of personal equipment that fit local styles. Money is often a problem, especially if the local technology can produce elaborate currency that is hard to counterfeit without a close examination. The Alpha Team is provided with compact items that might be of value in trade. Precious metals are a common choice. High-technology equipment may be carried, but only if it can be concealed very easily (covert-contact experts often have high levels of Holdout skill). The Alpha Team may carry weapons for self-defense, but those weapons must also blend into the setting.

An inhabited area is chosen for the mission, preferably a frontier or rural region which allows a landing close to a population center with minimal risk of detection. Once the Alpha Team lands, they make their way into contact with the local population. Naturally, the course of the mission should be played out as an adventure!

Goals

The overall goal of a covert contact mission is to smooth the way for further contact. The Alpha Team must decide what items or information later teams will need to better interact with locals. They should obtain examples of local currency, identity documents, clothing, personal equipment, and so on. They can also obtain scrolls, books, newspapers, downloads from library computers, any kind of documentation which will improve the expedition's grasp of the local language and social situation.

Naturally, all of this will mean interacting with the local population, unless the Alpha Team resorts to stealth and theft. If a PC must speak to natives, he should also roll against the local language skill to see how well he makes himself understood. Remember that any Alpha Team member lacking high levels of Language Talent will probably speak with some level of an accent!

Imitating a member of another culture is very difficult, even if the language is understood and spoken fluently. Each time the team interacts with natives, each member should roll against Acting to see how well he imitates a native's carriage, gestures, and speech patterns. The GM can apply bonuses or penalties to this roll, depending on the situation. In particular, anyone who speaks with more than a faint accent should have a penalty of at least -1. Success means that

the PC arouses no suspicions. On a failure, the native(s) will notice *something* strange about the PC. This may or may not cause Reaction penalties, depending on how tolerant the local culture is of nonconformity.

Follow-up

Once the Alpha Team returns home, its members are extensively debriefed and any materials it recovered are analyzed. A Linguistics roll will improve the language database so that up to 2 experience points may be spent on the associated Language skill. Anthropology or Xenology rolls may be applied to gain more detail on local political institutions and cultural parameters.

Depending on the success of the first contact mission, the expedition commander may call for more covert reconnaissance. These later forays are sent out with specific goals in mind, filling in gaps in the team's understanding of the local culture. Only when the expedition's contact experts are satisfied that there are no sociological "time bombs" in store will the team leader authorize open contact.

With some worlds, the Scout Service never gets beyond covert contact. Instead, on the recommendation of the discovering expedition's commander, the nearest sector-level IISS command will invoke the interdiction laws (see sidebar).

OVERT CONTACT

The Imperium does not have a "noninterference" policy as such. Many low-technology worlds have been openly contacted and brought into the Imperium. Naturally, Contact & Liaison Branch tries to make that process as smooth and mutually beneficial as possible.

Procedures

Overt contact is handled by a "Beta Team," which may include some of the same specialists as the Alpha Team. Beta Team, however, includes at least one diplomatic expert. Beta Team procedures are even more stringent than those followed by Alpha Team. Only a few items of high-tech equipment may be carried, usually a radio link and a pocket computer for each person. Most importantly, Beta Team carries no weapons, not even concealed ones, unless local law and custom permit it.

Goals

The goal of first overt contact is to reach the local governing authorities, make them aware of the existence of interstellar civilization, and reach an agreement with them allowing future Imperial activity on their world. How this is done is almost entirely up to the contact team leader, since the circumstances can vary *widely*. A few general guidelines are almost always adhered to.

First "open" contact is almost always handled with great discretion. The Beta Team uses covert-contact procedures until it can reach local officials. The existence of Imperial civilization is not demonstrated to the population as a whole until the local government agrees that this can be done. Even then, the announcement is normally made by local officials, with the contact team acting only in support.

Interdiction

The IISS is one of the two institutions that has the authority to invoke and enforce Imperial interdiction laws. Generally, the Service uses interdiction as a *protective* tool. It's most often used to defend worlds whose native culture or ecology would be endangered by full-scale Imperial contact. Asgard/Vilis and Pscias/Regina are two worlds in the Spinward Marches which fall into this category. It can also be used when a world is so hazardous that only expert explorers should be allowed to expose themselves to its dangers. Algine/Regina is an example of this situation. In contrast, the Imperial Navy tends to use interdiction as a *punitive* tool for enforcing Imperial policy.



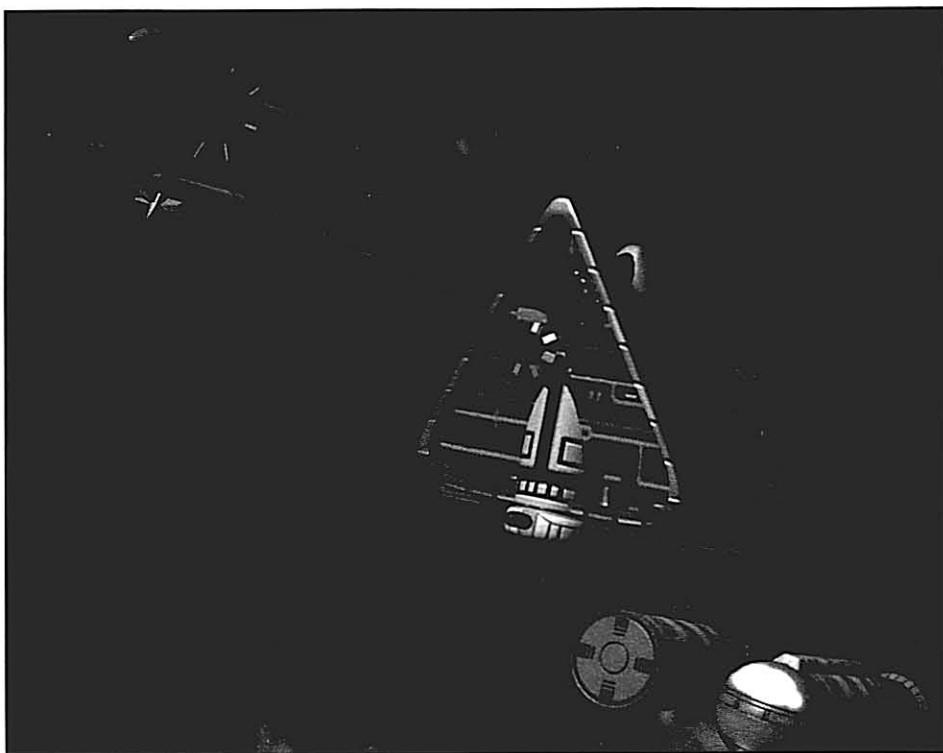
The procedure for interdiction requires a direct appeal to the Emperor, or (if the Emperor has delegated the authority) to some other member of the Imperial family. Such an appeal is never made lightly and is not normally done by any scout below the rank of Sector Scout Leader. If the appeal succeeds, a Decree of Interdiction is issued, authorizing the Service to muster a patrol squadron and maintain it on-station in the interdicted system. The Service could legally end the interdiction on its own at any point. Historically, however, whenever a world has been placed under interdiction status by the IISS, the understanding is that it is under the direct protection of the Imperial family. Therefore, the Service traditionally consults the Emperor or his agents before lifting an interdiction.

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Interdiction

[Continued]

While a star system is under interdiction, only the IISS has the authority to visit. The system is patrolled, often by squadrons formed around the largest ships in IISS service. In some systems, the scouts may allow visitors to refuel in the system, escorting them to and from a designated gas giant or ice moon. Visitors should be aware, however, that the scouts have the authority to shoot on sight. Meanwhile, an interdicted world is often a focus of exploration or covert-contact activity.



IISS Deployment

Regina subsector in the Spinward Marches is a center of scout activity. It can be considered a typical frontier region, and a good example of how IISS activities are distributed.

Efate (1705) is host to an IISS way station, and is therefore the subsector's control center for the Xboat network.

Knorbes (1807) is in long-term liaison status. A team of experts from Exploration Branch is also on-world, working with the Imperial Ministry of Conservation.

Ruie (1809) is a recent addition to the Imperium, annexed after the Fifth Frontier War. It is in long-term liaison status, with an unusually large Omega Team working with Imperial diplomats.

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The team should not reveal any details of Imperial scientific or technical knowledge. High-tech may be *demonstrated*, as part of the process of proving the contact team's assertions, but *how* devices work must be left to later discussions.

The team also may not discuss Imperial politics or institutions. Beta Team may admit to being from a star-faring civilization which is interested in continuing contact with the local society, but the details should be left as vague as possible. The team may promise that more information will be made available once a good working relationship seems likely.

Once local authorities are coping well with the implications of contact, the Beta Team should conclude an agreement with them, laying out how further contacts may proceed. This may require considerable negotiation. The scouts should gain free access to the local population, enough to complete in-depth lin-

guistic and sociological surveys. This normally requires that the local authorities cooperate, and that the scouts' presence be made known to the general population. The relationship should be set up so that the existing social and political situation is left as intact as possible. Beta Team should avoid being used in any local power struggles, withdrawing entirely if that appears necessary.

Follow-up

Overt contact normally continues until the expedition commander is satisfied that the local culture is ready for talks with other Imperial institutions. The IISS prefers to take at least a standard year to reach that decision, even in cases where the local culture is technically advanced, immediately understands the Imperium and is eager for trade. Of course, if the world is that promising there are usually outside

interests pressing for a faster result. In less favorable cases, the Overt Contact phase has sometimes lasted for over twenty years.

Overt contact can also end with invocation of the interdiction laws. This can occur because of serious but subtle cultural problems, which only become apparent after months or years of interaction. Interdiction after overt contact can also occur if the local authorities demand that they remain isolated from outside contact. Finally, the IISS may recommend interdiction if a *contact disaster* happens, a catastrophic mistake on the part of Beta Team which alienates the local society.

Note that these results will sometimes have a negative effect on the careers of the scouts involved. Contact disasters, in particular, are rare but almost always end the expedition leader's career in disgrace. This encourages contact leaders to be cautious. The Service prefers that a world be kept in covert-contact status or under interdiction until it is clear that the reaction to contact will be at least neutral. Few expedition leaders are willing to "jump the gun" by moving to overt contact too quickly.

Contact with Balkanized Worlds

Many worlds, especially high-population worlds at low tech levels, are balkanized. This can complicate contact procedures considerably.

When a potential new-contact world is found to be balkanized, IISS policy is to identify "major" societies and study them each independently. This implies a precontact assessment and series of covert-contact missions for each. The definition of "major" is deliberately left vague. As a general rule of thumb, the highest-population and highest-technology societies on a world must be studied fully. Any other societies which seem to hold local importance must also be examined. These might include widespread trading cultures, or "diasporas" which have no homeland of their own but retain distinctive language or traditions. Naturally, simply identifying what societies exist and determining the relationships between them can be a challenge.

When there are several major societies on a given world, a different overt-contact strategy is used. Quietly appearing before the leaders of several different societies makes the probability of mishap or misunderstanding much greater. Instead, the contact expedition will simply announce itself to as many people as possible, in every major society at the same time. This may involve radio transmissions or blatant spacecraft landings, depending on the situation. Such a "shock contact" often causes widespread disruption, but it actually *reduces* the risk of setting off conflict between competing local states. The contact can't easily be seen as a local rival's ruse, and it doesn't appear to play favorites. Shock contact also reduces the risk to individual scouts, who are not faced with the dangers of a standard Beta Team mission.

"For over a thousand years, the IISS has performed with great efficiency and considerable heroism. It has also maintained a spirit that is the envy of many a military commander."

*— Celeste Vitzor,
Security Branch*

LIAISON ACTIVITIES

Once the Overt Contact phase ends, the IISS gives up primary responsibility for Imperial interaction with a world. This begins the Liaison phase.

Short Term

Liaison activity is handled by another team from Contact & Liaison Branch. This team is officially called the Liaison or Omega Team, but scouts generally call it the "handover team." Omega Team for a given world will be much larger than were the Alpha or Beta Team, normally consisting of at least 10-60 members. Omega Team includes specialists in diplomacy and economics, as well as the usual linguistic and sociological experts.

Omega Team arrives on-world at the same time as the first Imperial ambassador and his staff. Soon afterward, the planet will be visited by other members of the Imperial nobility, megacorporate factors, speculative traders, and a variety of other citizens. The team's job is to support the Imperial embassy, advising the Ambassador of details of the local social and economic situation. If the Ambassador directs, the IISS will lend similar aid to other visitors as well (particularly the nobility).

IISS Deployment

[Continued]

Boughene (1904) has no IISS installation, but its position at the junction of several Xboat routes means that an unusually large number of *Purcell*-class tenders are present in-system.

Hefry (1909) is host to a scout base which is the subsector headquarters for Contact and Liaison Branch. A team of Exploration Branch scouts is attached to the local Colonial Office.

Regina (1910) is host to a scout base, local headquarters for Technical Services Office and (temporarily) for Exploration Branch. Local IISS personnel are often associated with the Regina Center for Research.

Pscias (2106) is an interdicted world. The IISS maintains a patrol squadron in-system, based at Hefry. The developing native society is usually left alone, but every few years a covert-contact team is sent to check on its progress.

Dentus (2201) has a scout base and (before the Fifth Frontier War) was a center of Exploration Branch and Intelligence Branch activity. The planet is currently interdicted by the Imperial Navy. The situation has given rise to considerable inter-service tension, and the IISS has drawn down local activities as far as possible.

Shinothy (2306) is a Red Zone system due to extreme navigational hazards, but is not officially interdicted. A team of IISS experts from Exploration Branch is involved in study of the unusual system.

Algine (2308) is an interdicted world. The IISS maintains a patrol squadron in-system, based at Regina. Covert-contact teams are almost always present on the planet, studying its diverse cultures and looking for ways to turn them away from their common xenophobia. An S-3 squad is officially based at Regina, but is actually stationed here more or less permanently to cover ongoing covert-contact operations.

Yurst (2309) is in long-term liaison status. An Omega Team is present to study the native minor race and help mediate between it and the Imperium.

Keng (2405) is also in long-term liaison status, with a small Omega Team present. The world is actually well-integrated into the Imperium, but IISS maintains its presence as a guard against interference from the nearby Freeport.

Inthe (2410) has a scout base, and is subsector headquarters for the Imperial Grand Survey.

Xmail

The express boat system is available to individuals and private concerns. Only messages may be sent by Xmail, of course. Packages and small cargoes must be sent via the Imperial Courier Service or a private carrier. The standard rate for Xmail traffic is Cr10 per gigabyte of data per parsec. Assume a minimum of Cr1 for any given message, no matter how short – every message has a minimum “handling fee.” Messages generally travel at about 2-3 parsecs per week along the Xboat network lines.

Standard data storage requirements for various items can be found in several **GURPS** supplements. Here are a few examples of what that 10-credit-per-parsec gigabyte can carry: 10 minutes of high-resolution video, an hour of ultra-fidelity audio, personal dossiers for 100 people, the executable code for a Complexity 3 computer program, the complete text of all the books on a 6-foot shelf, a year's full financial records for a medium-sized business, or the schematics for a complex device such as a large vehicle.

In practice, the vast majority of the traffic on the Xboat network is between high-technology, high-population worlds. Worlds with medium or low technology levels get a nearly free ride, generating and receiving so little data that the cost to the system is essentially nil. The flat fee has the effect of causing high-traffic segments of the network to subsidize low-traffic segments (where the express boats don't travel with a full load of data).

Note that the Xmail cost given here is *hundreds of thousands* of times lower than that published in early versions of **Traveller**. Today it seems reasonable to expect Imperial data storage technology to be many orders of magnitude more advanced than was once imagined. GMs can assume that the major worlds which make the most use of the Xboat system will generate enough traffic to make up the difference. The main effect on PCs is that they will be able to send and receive full-video “letters” rather than terse telegrams.

It's during this period that the scouts are often called on to perform “donation surveys” of the new world. The local government is usually interested in developing exports to the Imperium, but may not be aware of all local resources that might be worth exporting. In such a case, the Survey Office will be asked to do a comprehensive workup on the planet. A megacorporation, contracted to do a similar survey, would be too tempted to use the information gained for its own advantage. If the C&L teams have done their work properly, however, the locals will trust the IISS and regard it as an “honest broker.”

Long Term

Contact & Liaison Branch usually maintains an Omega Team in place until a world is fully integrated into the Imperium. This implies that local technology has reached a stable level against imports, exports are steady and profitable, and the local society has adjusted to new situation. Such a situation may take many years to appear.

Some worlds are resistant to integration, either because of isolationism or because there are local cultural traits repugnant to the Imperium. If it appears that the world will be a valuable addition aside from these obstacles, the Imperium may openly offer economic inducements for change, combined with a discreet campaign of cultural adjustment. The Omega Team usually acts in support of these efforts, although if the situation appears likely to go badly wrong the IISS is usually ordered to remove itself from involvement in the problem. The Imperium finds it useful to have at least one major institution which will be trusted by as many member worlds as possible.

CONTACT WITH ALIENS

Much of the above assumes that the culture being contacted is *human*. Since the foundation of the Third Imperium, that has always been the best bet for the Scout Service. Although human races are outnumbered by nonhuman species in Imperial space, the major human races were spread to many more worlds under the First Imperium and the Rule of Man. As a result, most of the new worlds contacted by the expanding Imperium have been occupied by humans. Naturally, nonhuman civilizations present the IISS with unusual challenges.

Precontact

For example, the precontact assessment becomes much more difficult with nonhumans. Although human languages are very diverse, they are all subject to the limits of human physiology and psychology. Even the differences between minor human races are trivial compared to the gaps between species.

A native language doesn't even have to be based on *speech*, semantic content encoded as a sequence of sounds. If the natives communicate in some other way, the usual linguistic procedures will work only with greater difficulty, if at all. Stealth probes may be able to see gestures, but they cannot interpret unusual communication forms such as pheromones or telepathy. Intercepted radio transmissions may be much harder to interpret or analyze if they encode a communications form other than speech. The GM will have to decide how to handle such cases, but *at a minimum* the task will require several times as many language samples. In any case, no matter how much information human scouts can gather, it will be difficult for them to produce any non-spoken language themselves.

The difficulty of understanding a nonhuman language is, by itself, a severe or even insurmountable obstacle. Once that obstacle has been overcome, the sociological assessment is actually no harder for a nonhuman culture. Once the language is understood, it yields the basic information needed to evaluate a culture, and it allows observers to interpret the activity they see.

Contact

Naturally, Imperial scouts (most of whom are human) may not be able to use extensive covert contact when dealing with a nonhuman civilization. Surgical alteration and disguise can only go so far in allowing a human being to imitate an alien of different physiology. The IISS has made a few experiments with custom-built robots, operated from a distance by Contact & Liaison specialists, but the results have been uniformly poor.

As a result, the Service's approach to contacting nonhuman species is rather different. Two overall strategies are available. The usual approach is to place the world under interdiction without even making any attempt at covert contact. The period of remote observation and interdiction is intended to last until the native civilization itself manages to attain spaceflight, at which time they will presumably be ready for contact at a distance from their homeworld. More rarely, the scouts go directly to overt contact, possibly using the "shock contact" strategy. This approach is used only when the native culture appears unusually ready for contact with outsiders, or when interdiction is not possible for reasons of Imperial politics.



Trading Stations

One of the lesser-known activities of the IISS is the maintenance of *trading stations* in scattered regions of the Imperium. A trading station is a small establishment intended to promote interstellar commerce, usually in a backwater or frontier region where robust trade routes do not yet exist. Most of them are operated by private companies, either on their own or under contract to the Imperium. Others are operated by branches of the Imperial government, particularly the IISS.

Trading stations operated by the Scout Service usually have a small staff of no more than 15-20 scouts, mostly from the Finance and Contact & Liaison Branches. Their services include brokerage, arranging warehouse storage, small-scale commodities exchange, linguistic and cultural translation, commercial database access, and so on. These services are free, and available to anyone on a first-come, first-served basis.

The Imperium's reasons for maintaining trading stations are complex. The Imperium has always spent a great deal of effort on promoting interstellar trade, as a matter of policy. Worlds that are bound together by prosperous trade are more likely to contentedly support Imperial power. Also, Imperial trade stations act as a small (but important) check against the megacorporations. The control of information can be a powerful weapon for a large, widespread corporation against its local competitors. The presence of a trade station prevents anyone from completely monopolizing information flow. Finally, many IISS trade stations are set up in border regions, and act to encourage trade with potentially hostile neighbors.

There are a number of IISS-run trading stations in the Spinward Marches. Most notable are the stations in the coreward sections of Regina and Aramis subsectors, posted to encourage trade with the Vargr. Several of these stations were damaged or destroyed during the Fifth Frontier War, but have returned to operational status now that peace has returned. There are persistent rumors that IISS Intelligence officers use the trading stations as cover for their own operations in the Vargr Extents. This seems unlikely, although Intelligence would certainly find the stations useful for information gathering.

Adventures

Scouts at Other Times

There is certainly enough scope for scout-based adventures during the main setting for *GURPS Traveller*. On the other hand, there are other periods in the Imperial "future history" that would also be appropriate.

The Interstellar Wars

During the epic conflict between the First Imperium and the upstart Terrans, both sides explored in search of advantage. Terran scouts sought out worlds unclaimed by the Imperium, for use as new colonies and military bases. Other Terrans ventured into Imperial territory to examine the enemy's worlds and learn about enemy cultures. For their part, the Vilani did much less exploration, but they did place outposts in several new systems, attempting to curtail Terran expansion and provide forward bases for the ultimate conquest of Terra.

The Rule of Man

After the fall of the Vilani Empire, the Solomani actually did little new exploration, as the challenge of ruling the Imperium was too great to allow such ventures. On the other hand, every world in the former Ziru Sirka was new to the Solomani. Small teams of the conquerors were often forced to cope with and *rule* worlds both alien and ancient. Vilani records and assistance were often useless, since the old Imperium had not spent much effort on understanding or accommodating local cultures.

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The IISS has a diverse array of missions, and can be the basis for a wide variety of campaigns and adventure hooks.

THE SCOUT CAMPAIGN

A scout-based campaign may be one of the few *Traveller* campaign ideas that works well for *active-duty* characters. After all, Field scouts in particular work in small teams, aren't closely supervised, and are expected to use initiative. That's exactly the best situation for exciting, free-wheeling roleplaying.

Exploration

Don't be fooled by the Imperium's relatively static borders and conservative outlook. There is still plenty of exploration going on in Imperial space. Hundreds of low-population worlds remain only partially explored, especially in frontier regions such as the Spinward Marches. While many such worlds are the private preserves of the Imperial nobility or of major corporations, the IISS remains involved with many others.

Of course, such ongoing exploration is not exactly a bold venture. Any Exploration team on such an assignment is on a world that has already been well-mapped, is probably supported by an IISS base or starship, and is no more than one or two jumps away from civilization. Other teams are likely to be attached to larger IISS operations, helping Survey or Contact & Liaison Branches with their work.

If they want a true wide-horizons adventure, Exploration Branch scouts will fight for berths on a long-range expedition, taking a *Pytheas*-class cruiser or some other large ship into new territory. The Scout Service normally has as many as a dozen such expeditions in the field at any given time, ranging from just outside the Imperial border to hundreds of parsecs deep in uncharted space. Some such expeditions take years to complete, and would make a good basis for a full campaign. The GM may do a lot of physical and cultural world-building, but he shouldn't neglect the potential for shipboard adventures as well. A large ship's crew will provide a variety of recurring NPCs (as well as a pool of characters to replace killed-out PCs).

Contact & Liaison

The physical exploration of new worlds is a trivial affair, compared to the intricate dance of contact with new cultures. Contact & Liaison Branch is active on many worlds in Imperial space. Almost every world that isn't wholly integrated into the Imperium has an Omega Team assigned to it. Campaigns centered around C&L Branch can involve a great deal of cultural puzzle-solving, along with intrigue involving Imperial nobles, diplomats, merchants or tourists.

Meanwhile, covert-contact missions go on frequently on low-tech worlds under interdiction. Such missions are often among the most dangerous undertaken by the IISS. Scouts under deep cover can't rely on immediate backup, don't have access to the full array of Imperial technology, are forced to work in a cul-

ture that is only partially understood, and are surrounded by potentially hostile primitives. Another point to remember is that low-technology cultures tend to be more diverse and are often more complex. Without mass communications, local dialects and customs won't be "smeared out" into a bland common culture. This implies that covert-contact agents will constantly be dealing with surprises.

In either case, Contact & Liaison scouts almost always work in small but loosely structured teams, ideal for PC parties. C&L campaigns will emphasize roleplaying and problem-solving rather than action. The GM will be most interested in generating a slate of recurring NPCs and fleshing out the target culture in great detail.

Courier

The Imperial Courier Service does no exploration, but it certainly faces a variety of missions. Whether the payload is an important Imperial personage, a small-but-vital cargo, or a packet of highly sensitive and important information, the Couriers often find themselves at the fulcrum of important events. Even a more routine task, carrying mail off the express-boat routes, brings couriers into contact with many of the Imperium's more unusual worlds.

Probably the best way to structure a Couriers campaign is around a starship, a *Suleiman*-class scout/courier or a *Khadumir*-class fast courier. The crew of such a vessel makes a coherent PC party, arranged so that players can fall into well-defined shipboard roles. Adventure ideas for such a campaign can be reasonably easy for the GM to generate. Just develop an interesting payload, a destination, and possibly an outside party which would oppose safe delivery.

Espionage

The role of the IISS in intelligence-gathering is not widely known, but it is important. Aside from the "passive" method of debriefing traveling detached-duty scouts, the Service also uses a variety of "active" methods. Scout ships penetrate deep inside foreign territory to collect signals intelligence (and to drop off or pick up espionage assets). Scouts also apply the same deep-cover observation techniques to foreign powers that they do to interdicted cultures. That tramp merchant ship meandering through "enemy" territory may be exactly what it seems to be, or it may be crewed by scouts who are compiling political, social and economic reports on the worlds they visit.

Spies tend to work alone, but many scouts in the intelligence business operate in small teams, suitable for PC parties. Note that such teams are not composed wholly of Security or Intelligence Branch scouts. Many (even most) of their members will be from the Exploration Office or Scout Fleet.

Scouts at Other Times

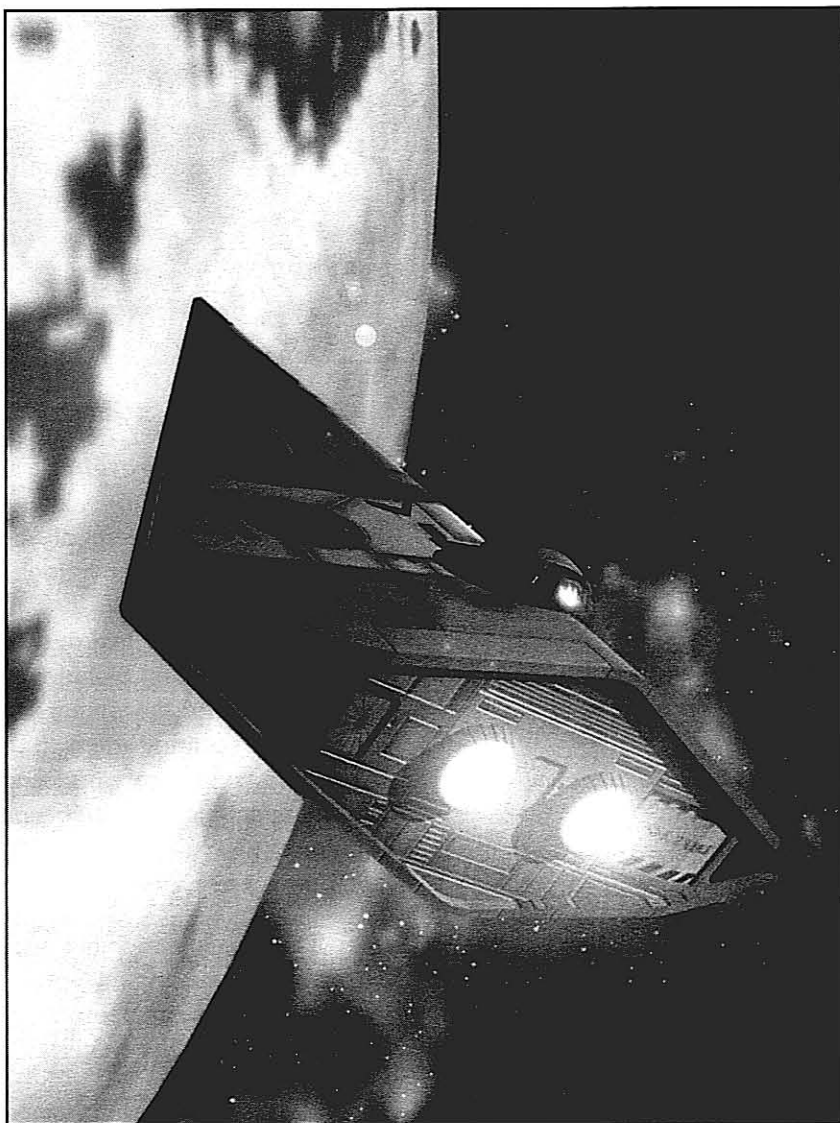
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Foundation of the Imperium

The IISS and its predecessor, the Sylean Federation Scout Service, were crucial to early Imperial expansion. During this period, exploration, contact and liaison activity were all on a grand scale. Successful scout teams could play a role in the conquest of whole subsectors, earning great rewards.

The Civil Wars

The Civil War period was a low point in the history of the IISS, as the Service barely managed to survive official neglect and the conflict between factions. Scout adventures during this period would involve a great deal of espionage and "freelance" activity, as scattered IISS detachments try to survive the chaos and help hold things together.



Kwai Ching

Kwai Ching (Spinward Marches 1040) is an independent world in District 268, far from direct Imperial influence and neutral in the growing conflicts elsewhere in the District. It is an unusual planet, with no atmosphere, very slow rotation, and a high axial tilt. Scientists speculate that a massive collision, perhaps a billion years ago, gave the planet its unusual rotation. The same collision apparently stripped away most of the planet's atmosphere and left the rest to freeze on the surface. In any case, the planet's mineral wealth (and available ice deposits) make it a likely candidate for rapid development in the near future.

Wartime

When war begins, the IISS is as involved as any other branch of Imperial service. A wartime campaign might be the best way to integrate scouts into "mixed" parties (those that include members of the other Imperial services). A scout specialist could reasonably be attached to any kind of military unit, even a mercenary unit that has been taken into Imperial service for the duration of the emergency.

The Base Campaign

Centering a campaign around a scout *base* seems antithetical to the usual idea of the scout campaign. After all, scouts are supposed to be voyagers, not tied to a specific place. Still, an IISS base on the fringes of the Imperium can be an interesting centerpiece for a campaign. Exploration and survey activities can be launched from there, the Xboat and courier services constantly pass through, Intelligence operations are controlled, members of the other Imperial services visit for consultations, and so on. A "base campaign" can provide variety and allow a diverse group of PCs to work from a common background.



Kwai Ching System

Number of Stars: 1.

Primary Star Type: K3 V.

Primary Star Characteristics:

Effective temperature 4800 K. Luminosity 0.26 solar units. Mass 0.71 solar units. Radius 0.0068 AU (100D radius 1.37 AU). Stable lifespan 27 billion years. Age 2.5 billion years.

Orbital Zones: Inner limit 0.14 AU, life zone 0.48 AU to 0.66 AU, snow line 2.5 AU, outer limit 28 AU. No forbidden zones.

Planets: Terrestrial planet at 0.21 AU, terrestrial planet (Kwai Ching) at 0.56 AU, planetoid belt at 0.91 AU, terrestrial planet at 1.6 AU, planetoid belt at 3.0 AU, terrestrial planet at 5.8 AU, terrestrial planet at 11 AU, terrestrial planet at 23 AU.

Continued on next page . . .

Detached Duty

The classic *Traveller* campaign involves a band of free-roaming troubleshooters, trying to make a living and see the Galaxy after leaving some prior service. Ex-scouts certainly bring some useful skills to any such band of voyagers. What is often overlooked is the kind of ready-made plot hooks that they provide the GM.

Scouts on detached duty are always subject to being called in for debriefing or for a few hours' technical work. At the very least, this can give the GM the chance to hand the players some new information, filling in campaign background or pointing them to an adventure. Sometimes the detached-duty scout will be asked (openly or secretly) to perform some long-range task, with which his companions will also become involved.

ADVENTURE OUTLINES

This chapter includes two full adventure situations, each of which can be used as the opening adventure for a scout campaign. The sidebars include more adventure and campaign seeds. There are also two examples of worlds from published *Traveller* material, expanded into more detail using the world-design systems in this book.

DIPLOMATIC POUCH

Mail carriers don't really want excitement, but when the mail has to go through the interstellar backwoods, excitement often drops by unannounced. Take this adventure, intended for the crew of the IISS fast courier *Phidippides*. The adventure works best if the courier ship is at most lightly armed. Shooting is a bad idea in any case.

Sabotage

The adventure begins near an independent world in the Trojan Reach, just rimward of District 268 in the Spinward Marches (this world can be drawn up by the GM or taken from published *Traveller* material). The world has been the target of corsair raids and Aslan incursions for several years now, and is interested in applying for Imperial client state status in exchange for protection. The Duke of Glisten dispatched a diplomatic mission to the planet to see what could be arranged. *Phidippides* was attached to the mission in case the diplomats needed to consult with the Duke quickly.

Recently the senior diplomat of the mission decided to send a diplomatic pouch back to the Duke, along with a request for instructions. The couriers are to take the pouch as quickly as possible, via Kwai Ching-Mertactor-Glisten. The pouch is a data solid, strongly encrypted, inside a very secure (and booby-trapped) case. The couriers don't have the decryption keys and can't open the case anyway.

All seems well until the moment that the ship drops out of jump at Kwai Ching. There is a *crunch* from the engineering compartment, and red lights spread across the navigator's board. If anyone is in the engineering compartment, he will suffer 1d damage due to a small explosion (reduced if in armor).

The ship has been hit by a "jump bomb," a rather vicious sabotage device. It's designed to be secreted on the hull of the ship, near where the drive interlocks with the hull grid that forms the jump field around the ship. When the bomb's instruments detect the transition to or from normal space, it detonates, damaging the jump drive. Why the bomb didn't go off when the ship *entered* jump space is a mystery, but if it had the result would probably have been a catastrophic misjump. As it is, the jump drive is slightly damaged. Repairs are possible, but several parts need to be replaced for which there are no spares in ship's stores. Presumably these parts can be obtained on Kwai Ching.

Cry Republic!

As *Phidippides* approaches the planet, the crew will see that something very unusual is going on. A backwater world such as this rarely has more than one or two ships insystem at any given time. At the moment, the sensor officer can count *seven* ships in orbit. Five of the seven are typical human-built TL10 ships, probably built by some world in the District. The other three ships are of Aslan design. Tonnages range from 400 tons up to 1,000 tons.

Phidippides will be hailed by local starport authorities, identifying themselves as representatives of the "Republic of New Liberty." The authorities will be *very* polite to the couriers, granting them clearance to land and refuel, but not talking about the local situation any more than necessary.

When the courier lands, the crew will be met by Willem Heydrich, the "new Undersecretary of State." Heydrich looks more like a mine worker than like a diplomat. He will also be polite, however, offering to assist the couriers in any way he can. On the other hand, he insists that an armed guard will be placed at the entrance to the couriers' landing pad, and that the couriers should not leave their ship without escort. These measures are for their protection, he claims.



Kwai Ching

[Continued]

Planet Kwai Ching

Planet Size: Diameter 5,000 miles. Density 5.2 g/cc or 0.94 Earth standard (Medium-iron world). Mass 0.24 Earth masses. Surface gravity 0.59 G.

Moons: None.

Dynamic Parameters: Orbital eccentricity 0.08, minimum separation 0.52 AU, maximum separation 0.60 AU. Orbital period 0.497 standard years (181.7 standard days). Tidal force (from primary star) 1.15, total tidal effect 12. Rotation period 21.5 standard days. Day length 24.4 standard days. Axial tilt 43 degrees.

World Type: Corrected size parameter 0.40 (Standard). Desert world (anomalous).

Atmospheric Pressure: None (anomalous).

Hydrographics: No surface water. Large subsurface ice deposits.

Native Ecosystem: None.

Atmospheric Composition: None.

Overall Climate: Albedo 0.16. Greenhouse factor 0. Blackbody temperature 265 K, average surface temperature 254 K (-3°F). Very Cold climate.

Resource Value: Very Rich.

Population: MSPR 0. PR 7 (30 million inhabitants).

Starport Facilities: Class III.

Political Type: Technocracy.

Control Rating: 5 (Repressive).

Base Technological Level: 9.

Unity of Government: World government exists.

The Kwai Ching Technocracy

The ruling body on Kwai Ching is the Board of Directors, a council with seven members. The Board holds legislative and judicial authority, making all government policy and reserving the right to interpret the law as well. Directors serve for life, after being appointed by their predecessors with the approval of the entire Board. Directors are almost always senior graduates of the University of Kwai Ching, with degrees in engineering or economics. The senior member of the Board is head of state.

Executive authority is vested in the office of the Senior Manager, who is elected for a single term of four local years (about two standard years) by a limited subset of the citizenry. Voters must be at least 40 years of age and may have no negative notations on their security record. The office is actually quite weak, subject to the whims of the Board of Directors.

A third institution is the Wardens, a secret police which ostensibly reports to the Board of Directors, but which is almost self-directed. The Wardens are the arm of state repression, maintaining security dossiers on every citizen and ensuring that no unapproved economic activity takes place.

Kwai Ching was settled about Year 500 by dissidents from Collace, who believed that the free-market economics practiced on their homeworld was dehumanizing. The Board of Directors was set up to govern the planet using strictly rational economic and social planning. This worked surprisingly well for a time, until (about 800) extensive deposits of industrial-grade gemstones were discovered on the planet. This brought many wealth-seeking newcomers from the Imperium and the Sword Worlds. The Board's stagnant planning structure was disrupted, forcing the Board to resort to oppressive tactics to keep in power. Kwai Ching has cycled between social unrest and police-state repression ever since.

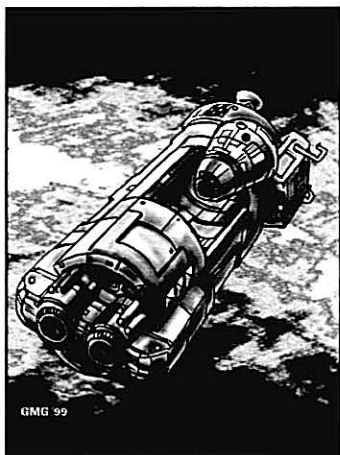
Kwai Ching has been carefully neutral in the various conflicts growing elsewhere in the District. In particular, the government has kept its port open to ships from both Collace and Trexalon, and has maintained trade links with the Agworld Combine.

Recently, the Board of Directors has been under pressure because of a series of raids against the planet's starport and major cities. The corsairs are of unknown origin, but they have managed to successfully raid the planet four times in the last eight years. The Board has hired off-planet mercenaries to beef up local defenses. There is considerable speculation about the nature of the raiders. No other world in the vicinity has been the target of such frequent or persistent attacks.

There are still "reactionary terrorists" about, who might be willing to create an incident by attacking Imperial representatives . . .

As the couriers will find out if they investigate, Kwai Ching has just undergone a revolution. Soon after the departure of the mercenaries who had been defending the planet (see sidebar), an armed uprising took place in several city-domes. The Board of Directors moved immediately to crush the rebellion, but within three days a small fleet of human and Aslan ships arrived and declared support for the rebels. Aslan marines seized the starport, while human invaders attacked Warden strongpoints. Soon the established government found itself running for its life. Presently there are still a number of loyalist leaders and Wardens at large, and there is still some fighting, but the "New Liberty Republic" is apparently in charge of the capital and the starport.

What will *not* be easy for the couriers to discover is the nature of the human "mercenaries" who are involved in the coup. They and their ships are from Trexalon, a nearby independent world with a strongly anti-Imperial stance. They do not wear Trexalon uniforms, however, and only a few high officials in the Republican government know for certain who they are.



Getting Repairs

The most obvious problem faced by the couriers is getting the replacement parts they need for their jump drive. Considering how polite the Republic's government has been, the couriers may be tempted to ask them for assistance, but this would be a mistake. The Republic and its Trexalon allies are unwilling to seize or fire on an Imperial ship, but if they realize that said ship needs repairs they will be only too happy to put one obstacle after another in the way. Calls will not be returned, former contacts will be out of the office, independent suppliers will mysteriously not have the needed parts.

Meanwhile, even if the Republic doesn't learn about the needed repairs, the armed escort that accompanies the couriers on every trip will politely but firmly interfere with everything they attempt. Of course, the guards are rebel militia rather than Trexalon regulars, and are less than completely competent. The couriers may be able to evade their escort once or twice before the guard is replaced by more efficient troops.

There are two other ships in port. The *Dyarann Sunrise* is a 400-ton subsidized merchant owned by McClellan Factors. The Republic has refused it permission to offload or onload cargo, and although the merchant has clearance to leave her captain is very unwilling to do so without a chance to trade. The crew of the *Sunrise* will be a good source for information about local conditions, since they have been here since shortly after the coup. Any attempt to contact them will be monitored or interfered with, however.

The other ship in port is the *Ian MacGregor*, a 200-ton far trader with Collace registry. She is under security lockdown in her pad, her cargo impounded and her crew interned by the Republic. Collace is Trexalon's foremost rival in the region, and the insurgents regard the *Ian MacGregor* as a security threat.

The jump drives on *Dyarann Sunrise* are incompatible with those of the fast courier, and she has none of the needed spares. However, the *Ian MacGregor* has compatible parts, not an exact match to specification for the fast courier, but probably close enough. Assume a Mechanic (J-Drive) roll at -4 to adapt the parts, if the couriers can gain access to them in the first place.

Contacting the Underground

The couriers have the option of trying to contact the loyalist underground. If they don't, or if they run into trouble, the underground may contact *them*. The Directors may be in hiding, but their loyalists know Kwai Ching's cities better than the Trexalon or Aslan invaders, and they have contacts sufficient to keep them from being found and arrested for a while.

The Directors would be willing to help the couriers find the parts they need, in exchange for a promise to inform Imperial authorities about the coup. The Directors are confident that ships from the 100th Fleet at Mertactor would intervene, if it were known that Trexalon and Aslan *ihatei* had set up a puppet government here.

Naturally, contacting the Directors is very dangerous. If the Republic discovers the contact, the gloves will come off. Republican troops will happily try to "accidentally" kill Imperial officers in the firefight, while trying to arrest the "terrorists."

Wrap-up

If the couriers manage to repair their ship and leave the planet, this should be considered a success. If they put the pieces of the political puzzle together and realize that the Trexalon-Aslan alliance is making a major power play in the District, all the better. This adventure may be a good lead-in for an IISS campaign set in District 268, during a "hot war" between Collace and Trexalon.

HARD EXTRACTION

This adventure describes one of the most dangerous missions open to IISS personnel: covert contact on an interdicted world. Exploration Office scouts are best suited for it, possibly with the backing of one or two Security Branch tactical experts.

Missing Man

The team is assembled in the office of Scout Commander Musa Traore, commander of IISS activities in Algine system. He informs them that a critical situation has arisen on the planet. Just before sunset local time, an episode of violent rioting took place in the city of Piraos, the main seaport and capital of the Realm of Elaas. There were three deep-cover observers in the city at the time. Two of them got out and made it to an extraction point. The third, a local-culture expert named Eneri Mahdavi, didn't. His personal communicator isn't responding, so there is no way of locating him from a distance. Surveillance drone overflights have turned up no sign of him.

Traore tells the party to prepare for Alpha Team duty in the city of Piraos. They will be inserted as close to the city as possible, just before sunrise local time. They are to find Mahdavi and bring him to the extraction point, if possible by themselves. There will be an S-3 squad standing by, ready to intervene if the party calls for them, but that's to be considered a last resort. If Mahdavi is actually dead, the party should verify that fact and then return.

There are two complicating factors. First, the scouts who escaped from Piraos are puzzled about the rioting. There is certainly some social unrest in the city, but the usual time for disturbances is early in the planet's very long day, before oppressive heat and torrential rains set in. Rioting is almost unheard-of so soon before sunset. Also, the royal musketeers who form the city's security force seemed surprised by the riot, which came up very suddenly and without apparent provocation. The local situation should be considered dangerously unstable.

Adventure Seeds

Mason-Dixon

Pagaton (Spinward Marches 1624) is a low-tech world divided among many small nation-states. Conflict between these nations is normally kept to the level of harsh language, since resources are plentiful and most local cultures are unaggressive. The government of Winsadi has recently contracted with the IISS to survey and mark its border with the neighboring state of Jyrell. The contract calls for the border to be surveyed using advanced technical methods, but it must be *marked* using techniques that can be maintained by local workers. The process is also not to disturb the local ecology. This means that Survey teams must traverse the border on the ground, placing markers along its length. Naturally, the border is disputed by the Jyrellians, and runs through some very rough country.

The Xboat Adventure

After a long misjump, the pilot of an express boat finds himself lost well outside of Imperial space. There's a habitable world not too far away, and fortunately it's home to a spacefaring culture. The aliens are able to rescue the pilot, but they know nothing of the Imperium and have never had any contact with outsiders. The pilot becomes a player in local political conflicts, trying to discover his location and find a way to return to civilization. This adventure works best for a single player, although the GM can use it as the lead-in for a multi-player campaign (with the other players taking the role of natives).

Back Door

Data and ships are routed through the Xboat network by a sophisticated software package, designed by Naasirka and installed on large computers at every IISS way station. Now an investigation of accounting discrepancies at one way station has led to an astonishing discovery: an unknown person or group has subverted the routing software. As a result, they have access to the network without paying for it, and are using that access to break into private and Imperial computers at interstellar distances! A team of scouts is assembled from the Communications Office and Security Branch, and assigned to track down the data pirates. To accomplish their mission, they will need to visit many worlds along the Xboat lines. The more they investigate, the deeper they will find the conspiracy and intrigue to go.

Continued on next page . . .

Adventure Seeds

[Continued]

Out of Thin Air

Gemwood is the latest hot luxury item on half a dozen wealthy worlds. Quietly, gemwood carvings and gemwood furnishings have been appearing in executive boardrooms and private estates. Hard as diamond, brilliant as jade, smooth as silk, warm as fine oak – gemwood is in fierce demand. Yet no one knows where it comes from. Except the IISS, which has had the gemwood tree's homeworld under interdiction for centuries. The IISS also knows that guns have been appearing on that world, leading to bitter tribal wars over the gemwood groves. A team of Security officers is sent to find out how the smuggling is being done and stop it at the source. The only problem: the interdiction patrol is *tight*. How are the smugglers reaching the planet? Could scouts actually be helping them?

Bloom

728-907 (Spinward Marches 1213) is occupied only by a small team of scouts from Base Branch, who operate an emergency-landing facility. The planet is known to lack mineral wealth, and so no one has ever tried to settle it. In fact, hardly anyone ever visits, except for the IISS relief ship that swings by twice a year. Now *something* is affecting the native life forms. New animal species are suddenly appearing in the area of the outpost, moving about in ways that seem almost purposeful. The air is rich with strange pollens and spores. The scouts manning the outpost aren't Exploration Office hotshots, but they are the men on the spot. With months to go before the next relief ship, no one else is going to figure out what's going on. In time, that is.

Casablanca

Faisal (Spinward Marches 0518) is a dreary low-tech world whose only outstanding feature is its location, situated in a frontier region between Imperial, Zhodani, Darrian and independent spheres of influence. There's a small IISS operation on the world, maintaining the local environmental technology in exchange for control of the starport. The open secret is that this gives Intelligence Branch a superb base of operations in a critical region of space. Now someone is trying to upset the IISS applecart, stirring up rebellion and anti-Imperial sentiments among the people of Faisal. The Intelligence agents on planet must stop the plot or the Imperium will lose a valuable piece in the Great Game.

The second complication: Algine's primary is an occasional flare star, and the expedition's scientists predict that there will be a major flare sometime in the next few standard days. The flare should present the team with no imminent danger, but for a period of 1-2 hours radio communications will be cut off. The team should work quickly, and be prepared to work without backup if the star flares.

The team has discretion to choose its own cover story and equipment. The best cover story would be for the team leader to play the part of a middle-class merchant, come to Piraos to do some business and visit local religious shrines. Other team members can play the parts of the merchant's family, aides, or bodyguards. The team will be provided with appropriate clothing and personal items, along with about \$1,000 in local currency. It would be reasonable for them to carry blade weapons, but not handguns. The party may also take a few pieces of easily concealable high-tech equipment, such as a small first-aid kit, a biosniffer, or similar items. Anything else (such as advanced weapons) will have to be concealed even from other scouts. It's standard procedure for the team to be inspected before departure, to make sure no out-of-place items are being carried.

Each member of the team will be issued a covert-action communicator (see Chapter 2). Members of the party may choose to carry spares.



The Search

After being dropped off, the team should have no trouble walking to Piraos, arriving at the city gates during the slow sunrise.

While the scouts move around in the city, they will sometimes encounter royal musketeers. These are uniformed troops, moving in groups of three or more. They carry sabers, and breech-loading flintlock rifles roughly equivalent to the Ferguson rifle listed in the *Basic Set*. They will be unfriendly and menacing, and may harass the scouts without provocation. They can, however, be discreetly bribed by small sums of money.

There are three good places to search for Mahdavi. In his cover identity, his home and place of business were in the Street of the Glaziers. He sold glassware

and fancy beadwork to an upper-middle-class clientele. If the team looks there, they will find that the street was hard-hit by rioting. Mahdavi's house in particular was gutted, the shop's contents smashed and the whole building set ablaze. The residents will be suspicious of strangers (-3 to Reaction) and don't know where Mahdavi is in any case. He was last seen before the rioting.

Another place to search might be at the Citadel of Justice, a massive stone prison which also serves as headquarters for the royal musketeers. A search of records from the time of the riots will turn up no evidence that Mahdavi was arrested.

Finally, the party will know from Mahdavi's reports that he was in contact with an ethnic-minority community within the city: the Phersi. The IISS doesn't know much about the Phersi, except that they have no nation-state of their own, living instead in their own isolated neighborhoods in many of the East Continent's cities. Mahdavi had apparently befriended several residents of the Phersian Quarter in Piraos.

The Phersian Quarter

If the party goes to the Quarter, they will find it walled off from the rest of the city. There is one gate, guarded by musketeers. If the scouts watch for a time, they will see that the musketeers allow people out of the Quarter, although usually with a bit of harassment on the way. They are allowing no one in except residents of the Quarter. Phersi are distinctive in appearance. Their complexion is unusually dark for a native of Algine, and they wear a distinctive costume, including a black hood which both men and women are apparently required to wear when outside the Quarter. They are apparently an oppressed minority, although their demeanor is quiet and proud.

Under no circumstances will the guards allow the party to enter the Quarter. If properly approached, they may send one of the Phersi to summon a leader of the community. The man who answers the summons is a dignified man who introduces himself as Resa Kerman, an elder.

Kerman will appear to be reluctant to talk about Mahdavi, but he will eventually admit that he and Mahdavi were friends. He claims that Mahdavi is dead, caught by accident in street fighting during the recent riots. Kerman believes that the bodies of those killed in the riots have been collected near the Citadel of Justice for disposal. Would the visitors like to see? Kerman is lying throughout, although he is very smooth (assume he has Acting of 15 or better).

Kerman will leave the Quarter long enough to guide the party to a public square near the Citadel. There, a number of bodies have been unceremoniously dumped and are beginning to decay. Two squads of musketeers are standing by to ensure that no violence breaks out, but there is also a crowd of angry citizens. Some people are moving among the bodies, looking for loved ones. From time to time there is a wail of anguish, the crowd mutters more angrily, and the musketeers shift more uneasily.

Kerman excuses himself as soon as possible. If the PCs investigate, they will eventually find a glint of metal next to a partly burned body. The metal object turns out to be an IISS covert-action communicator, damaged beyond repair by fire and a heavy blow. The body is not that of Mahdavi, as examination by a physician or a character with a biosniffer will reveal. It's a male human of about the right age and build, but it's definitely a native of Algine, not Mahdavi.

At about this time, the escalating tension between crowd and musketeers will boil over and the adventurers will find themselves in a flash riot. The greatest danger is from the musketeers, who will fire wildly in an attempt to disperse the crowd. The scouts would be best advised to escape.

Algine

Algine (Spinward Marches 2308) is an interdicted world, its entire star system under IISS jurisdiction. Covert contact teams are often on the planet, observing the violently xenophobic native cultures.

Algine System

Number of Stars: 1.

Primary Star Type: M8 V. Star exhibits occasional flare activity.

Primary Star Characteristics: Effective temperature 2,600 K. Luminosity 0.001 solar units. Mass 0.063 solar units. Radius 0.0014 AU (100D radius 0.28 AU). Stable lifespan 630 billion years. Age 5 billion years.

Orbital Zones: Inner limit 0.013 AU, life zone 0.03 AU to 0.04 AU, snow line 0.16 AU, outer limit 10 AU. No forbidden zones.

Planets: Terrestrial planet (Algine) at 0.033 AU, planetoid belt at 0.33 AU, gas giant at 0.63 AU, gas giant at 1.2 AU, gas giant at 2.4 AU, planetoid belt at 4.8 AU, terrestrial planet at 9.6 AU.

Planet Algine

Planet Size: Diameter 6,600 miles. Density 5.0 g/cc or 0.91 Earth standard (Medium-iron world). Mass 0.52 Earth masses. Surface gravity 0.75 G.

Moons: None.

Dynamic Parameters: Orbital eccentricity 0.15, minimum separation 0.028 AU, maximum separation 0.038 AU. Orbital period 0.0239 standard years (8.72 standard days). Tidal force (from primary star) 660, total tidal effect 6,341. Planet is tide-locked in a 2/3 resonant pattern. Rotation period 5.81 standard days. Day length 17.44 standard days. Axial tilt 8 degrees.

World Type: Corrected size parameter 0.64 (Standard). Ocean world.

Atmospheric Pressure: 0.9 atmospheres (Standard).

Hydrographics: 58% surface water.

Native Ecosphere: Complex animals, all animals are nonsentient. Planet is Earthlike.

Atmospheric Composition: Oxygen-nitrogen.

Overall Climate: Albedo 0.24. Greenhouse factor 0.18. Blackbody temperature 272 K, average surface temperature 300 K (80°F). Earth-normal climate.

Resource Value: Poor.

Population: MSPR 9. PR 9 (7.4 billion inhabitants).

Starport Facilities: Class 0. Interdicted.

Political Type: Dictatorship.

Control Rating: 4 (Controlled).

Base Technological Level: 5.

Unity of Government: Diffuse.

Alaine: World History

During the Interstellar Wars, the Terran Confederation often feared that it would be overwhelmed by the might of the Vilani Imperium. In an attempt at ensuring the survival of Terran civilization, the Confederation sent out several colonial expeditions using slower-than-light generation ships. Some of these were sent to rimward, away from the Vilani, but others were sent coreward-spinward to cross the Great Rift.

One such ship reached Alaine about -1000 and founded the human settlement there. Unfortunately, ethnic and ideological divisions split the colony early on, leaving it vulnerable when a series of Vargr raids struck the planet. The result was a collapse of industrial civilization. By about -750, Alaine's settled areas had fallen back to TL2 (TL3 in a few areas). Ever since, war has been common among the various tribes, city-states, kingdoms, and occasional empires. Further, the people of Alaine have developed a deep-seated mistrust of anything coming from off-world. Local myth is full of frightening tales of the Vilani Imperium, and of vicious wolf-demons who attack without warning from the sky.

The natives of Alaine are still recognizably Solomani, with languages and cultures descended from those of Old Terra. A certain amount of mutation and genetic drift has occurred, however. Most populations have become uniformly light-skinned, having lost the high level of melanin production that was necessary under Terra's more energetic sun. In some populations, the rate of actual albinism has reached as high as 1 in 10 births. Local cultures have developed elaborate means for predicting the occasional flare episodes of Alaine's sun. A large flare can put out enough ultraviolet light to give a pale human or an albino very bad sunburn, so most natives go indoors for the hour or two that a flare is dangerous.

Alaine was rediscovered by Imperial scouts in 118. There were several attempts at open contact, but these all failed due to the aggressive xenophobia of the world's population. The world was placed under Imperial protection by the Emperor Artermus, and has been in some form of interdicted status ever since.

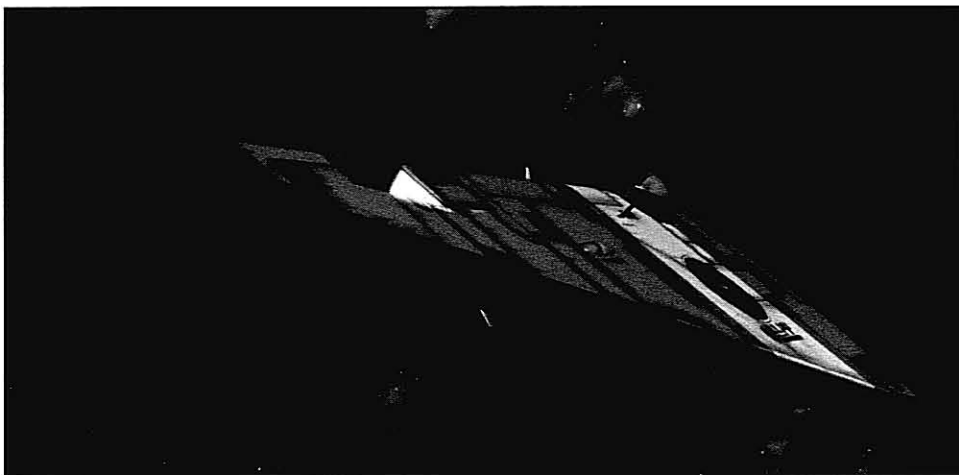
Since about 850, the IISS has been aware of social and technological advancement in several of the nation-states of the East Continent. These states have reached TL5 and are in the process of building colonial empires around the rest of the planet. IISS covert-contact activity has concentrated in this region for several decades now.

Gone Native

At this point, it should be obvious that Mahdavi is not really dead, and that he has gained the help of the Phersi in hiding from the IISS. The team will have to decide what to do next, and given their wide variety of options the GM will need to improvise. In any case, the task will be difficult. Both Mahdavi and his Phersian friends are very cunning, and Mahdavi has taught his allies about the potentials of Imperial technology.

The truth of the matter is as follows. The Phersi have retained much more knowledge of their origins and history than most Alginites. Their insular culture has enabled them to pass along very old traditions, with almost no loss of information from one generation to the next. They are aware of the existence of interstellar civilization, and from Mahdavi they have learned much about the Imperium. Their goal is to break free of Alaine and return to the stars, but *on their own terms*. They retain the common Alginite xenophobia and are unwilling to trust the Imperium. They trust Mahdavi because he has immersed himself in their culture and developed a personal relationship with them. For his part, Mahdavi believes that IISS policy toward Alaine is fundamentally misguided, and he is willing to give up his career to help the Phersi reach their goals. The riots were set off by the Phersi in order to cover Mahdavi's disappearance.

If the party comes too close to Mahdavi, he and his allies will respond with force. He will be unwilling to kill fellow scouts, but he will gladly frighten them off, or capture them so that S-3 has to rescue them while he makes his escape. The GM might use a stellar flare for dramatic effect, cutting the team off from support at a critical moment. Note that the Phersians do not share the usual Alginite aversion to flare sunlight – they have a darker complexion and can tolerate more ultraviolet light. This may be good (once) for tactical surprise against the PC team.



Wrap-up

If the team simply escapes, having learned about Mahdavi and the Phersi, this can be regarded as a partial success. Actually extracting Mahdavi is a complete success, especially if the S-3 team doesn't have to intervene. This adventure would make a good set-up for an exploration-and-contact campaign set on Alaine. The planet has a wide variety of cultures, and many details are unknown to the IISS even after a long period of study. In fact, if Mahdavi *escapes* he might make a good recurring villain, as he mounts his one-man crusade to bring Alaine back into interstellar civilization.

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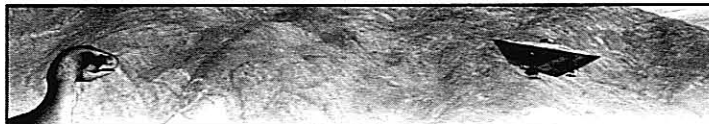
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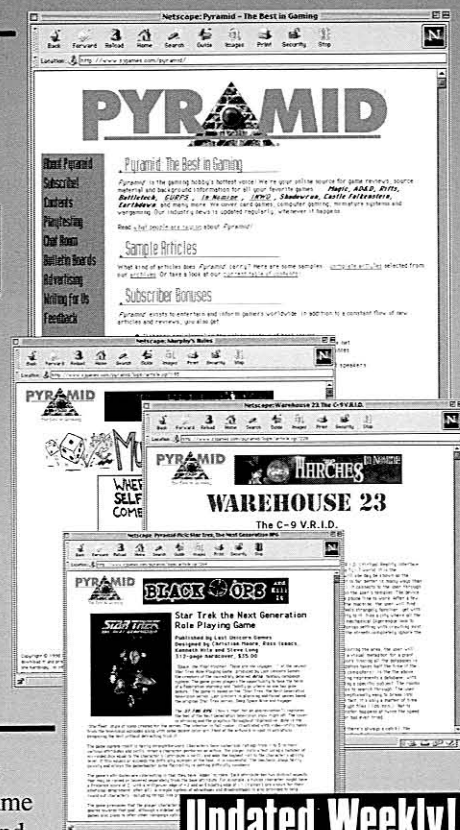
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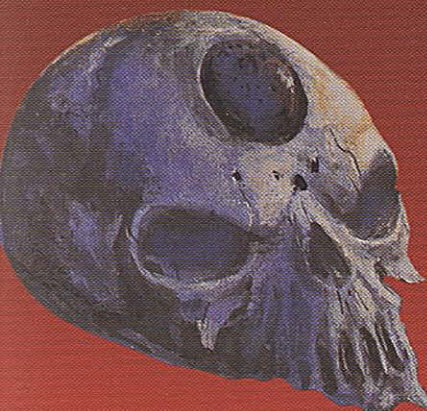
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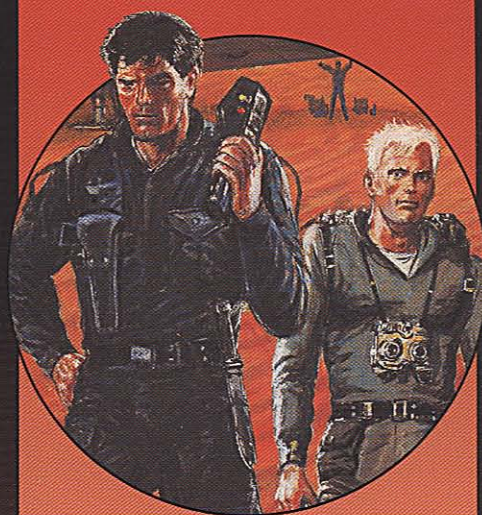
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Cover by
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GLENN GRANT,
JOHN GRIGNI,
AND TOM PETERS**

FIRST EDITION
PUBLISHED MAY 1999

ISBN 1-55634-368-X



9 781556 343681

SJG02095 **6605**

Printed in the
U.S.A.